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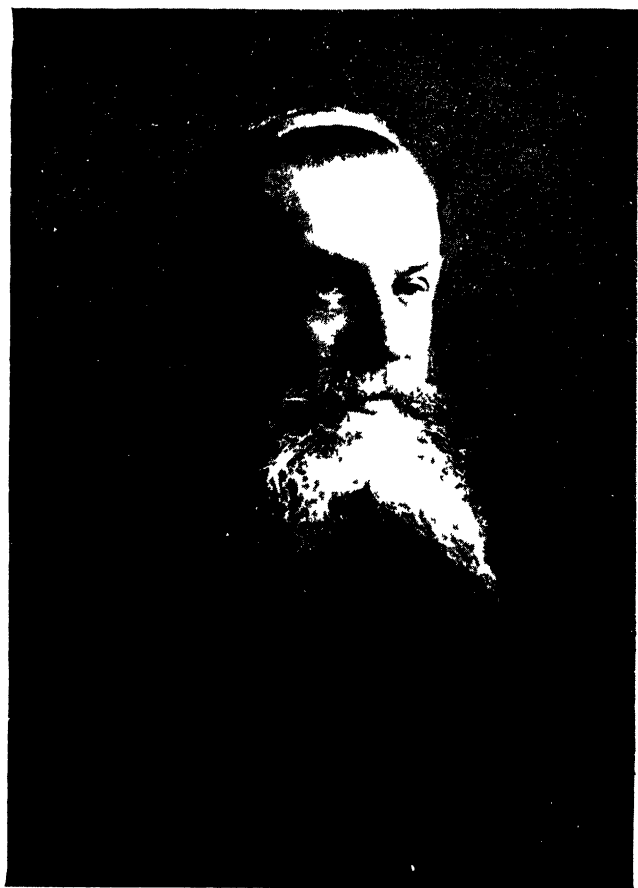
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CONTRIBUTED TO BRITISH AND FOREIGN JOURNALS

FROM JULY 1, 1901 TO JUNE 30

**1902**

WITH THE

TRANSACTIONS

OF THE

BRITISH PHARMACEUTICAL  
CONFERENCE

AT THE

THIRTY-NINTH ANNUAL MEETING

Held IN

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(a) To bring under the notice of pharmacists, principals, and their assistants, in their districts, who are unassociated with the Conference, the advantage of membership with it, and by personal effort to try and induce them to join

(b) To assist in stimulating research by asking pharmacists, who have the time, ability, and disposition, to contribute from time to time a paper or useful note to its annual meetings

(c) To endeavour to induce defaulters to continue their membership

(d) To take generally a watchful and sympathetic interest in the affairs of the Conference

To render these services voluntarily at times convenient to themselves and as opportunity offers.



# THE BRITISH PHARMACEUTICAL CONFERENCE.

AN ORGANIZATION ESTABLISHED IN 1863 FOR THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH, AND THE PROMOTION OF FRIENDLY INTERCOURSE AND UNION AMONGST PHARMACISTS.

THE most important ways in which a member can aid the objects of the Conference are by suggesting subjects for investigation, working upon subjects suggested by himself or by others, contributing information tending to throw light on questions relating to adulterations and impurities, or collecting and forwarding specimens whose examination would afford similar information. Personal attendance at the yearly gatherings, or the mere payment of the annual subscription, will also greatly strengthen the hands of the executive.

A list of subjects suggested for research is published early in the year. Resulting papers are read at the annual meeting of the members; but new facts that are discovered during an investigation may be at once published by an author at a meeting of a scientific society, or in a scientific journal, or in any other way he may desire; in that case, he is expected to send a short report on the subject to the Conference.

The annual meeting for 1903 will be held at Bristol.

Gentlemen desiring to join the Conference can be nominated at any time on applying to the Secretaries, or any other officer or member. The yearly subscription is payable in advance, on July 1st. The amount, which includes free delivery of the Year-Book, is 7s. 6d. for members residing within the Postal Union. Further information may be obtained from

THE ASST. SECRETARY, BRIT. PHARM. CONF.,  
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## THE YEAR-BOOK OF PHARMACY.

The Conference annually presents to members a volume of about 600 pages, containing the proceedings at the yearly meeting, and an Annual Report on the Progress of Pharmacy, or Year-Book, which includes notices of all pharmaceutical papers, new processes, preparations, and formulæ published throughout the world. The necessary fund for accomplishing this object consists solely of the subscriptions of members. The Executive Committee, therefore, call on every pharmacist—principal, assistant, or pupil—to offer his name for election, and on every member to make an effort to obtain more members. The price of the Year-Book to non-members is ten shillings. The constitution and rules of the Conference, and a convenient form of nomination, will be found at page 301.



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## INTRODUCTION.

ALTHOUGH no exceptionally eminent discovery, nor any sensational event has occurred in the past twelve months, such as the isolation of the new atmospheric gases, or the more recent epidemic of arsenical poisoning, yet the consensus of work accomplished in pharmacy, and in the sciences on which it is founded, is satisfactory in quality, and abundant in quantity, for the period under review.

This is notably the case in the domain of Inorganic Chemistry, in which the brilliant school of French chemists and physicists, combining manual dexterity with philosophical reasoning, have worthily upheld the great tradition they have inherited from the savants of their nation of former generations. True, too, to another tradition, their results are generally recorded in an elegance of language and a lucidity of literary style, which is not, unfortunately, always the distinguishing feature of the scientific treatises of investigators of other countries. Most prolific among these has been *H. Moissan*, who has materially added to the number of known *silicon compounds*, having isolated and described, in conjunction with *S. Smiles* and others, a new *silicon hydride*  $\text{Si}_2\text{H}_6$ , as well as the *silicides of lithium* and of *calcium*. The same worker has prepared and described pure *niobium*, *potassium hydride*, and *metallic tantalum*. *C. Chabrie* has obtained new *Cesium salts*, the sulphites and thiosulphate. *H. Joule* describes a so-called *new phosphate of sodium*  $\text{Na}_3\text{H}_3\text{2PO}_4$ . *P. Curie* and *A. Debierne* have continued the investigation of the properties of *radium* with results of great interest to physicists. *G. Urbain* and *H. Lacombe* have obtained a new *volatile salt of glucinium*  $[\text{CH}_3\text{CO}_2]_6\text{Gl}_4\text{O}$ , and also describe a basic *beryllium acetate*  $[\text{CH}_3\text{CO}_2]_6\text{Be}_4\text{O}$ . *A. Miahle* has investigated a long series of crystalline *double salts* formed by *tetra-cupric hydrate* with salts of metals, and also those of *mercuric oxide* with saline compounds. *H. Gautier* has prepared *strontium hydride* in a pure form.

*G F Joubert* has discovered a new and portable source of oxygen in the form of compressed tablets of sodium peroxide or the double peroxide of sodium and potassium, a discovery from which important results are anticipated. *V Auger* has reinvestigated the phosphates of manganese. *P Labeau* gives methods for preparing lithium antimonide,  $\text{Li}_3\text{Sb}$ , and a new cobalt silicide  $\text{CoSi}$ . *J Ferrié* announces the isolation of chromous oxide,  $\text{CrO}$ .

*P C Ray* describes a method of preparing pure mercurous nitrate  $\text{Hg}_2(\text{NO}_3)_2$ . *I Gutbier* attributes the formula  $\text{H}_4\text{TeO}_6$  to telluric acid, and *V Lehner* gives a method for preparing tellurium tetrachloride  $\text{TeCl}_4$ . *F Giesel* is unable to find any chemical difference between radio active lead and the ordinary metal. *L J Howe* describes some new ruthenium compounds.

*I J Wauelllyn* finds that the yellow precipitate produced by  $\text{AsH}_3$  in  $\text{AgNO}_3$  solution has the composition  $3\text{Ag}_2\text{O}, \text{As}_2\text{O}_3$ .

*V Lehner* has studied the action of selenic acid on gold and *C R Boehm* points out that commercial medicinal cerium oxalate contains, as a rule, a remarkably low percentage of the pure salt. *J A Collie* shows that  $\text{CO}_2$  is decomposed into O and CO by sparking under reduced pressure, and *I Stoll* gives a method for preparing pure hydrogen antimonide.

Among the processes and results of analytical investigations having a bearing on pharmacy, which have appeared in the last twelve months may be noted an exhaustive series of tests for the identification of  $\alpha$  and  $\beta$  cocaine and their distinction from cocaine by *C S Parsons*. *J Penrock* and *D A Morton* give an excellent scheme for the analysis of solution of ammonia. *G Demiges* publishes a process for the detection and determination of antimony in the presence of arsenic. *H Cousin* calls attention to the impure condition of much of the commercial "aristol," which he finds to be far from being pure dithymol diiodide.

*I I Thorne* and *H E Jeffers* give a useful method for removing arsenic from hydrochloric acid. *J Bouganilt* recommends a reagent composed of a solution of sodium hypophosphite in hydrochloric acid for the detection of arsenic in glycerin. *J de Brians* gives a method for the detection of benzoic acid and benzoates in alimentary substances, to which they are now largely added as preservatives, an addition which is not permissible in some countries. *I S Barré* gives a modification of the method for the acidimetric titration of boric acid and borax, *H Droop Richmond* and *J B P Harrison*, another modification for the detection of the same acid in butter. *A. Faucon* finds that com-

merical *caffeine iodide* is so unsatisfactory that its use in medicine cannot be advocated.

Lyman F. Kebler publishes a method for the determination of *chromic acid* and *chromates*, by means of the iodine liberated by them from KI, followed by titration in the usual manner. H. Proelss gives a series of tests for the not very satisfactory toxicological detection of cocaine or its decomposition products. J. Wauters avails himself of a modification of the Reichert-Meissl method of determining the volatile fatty acids to detect the adulteration of *cacao butter* with *coconut fat*. L. M. Tolman modifies *Becchis' test* for cotton-seed oil in olive oil by first shaking the oil to be examined with alcohol to remove oxidation products, which may vitiate the results. F. Thomas and W. Weber suggest the use of dry casein as the standard material for the determination of the *proteolytic action of ferments*.

J. P. Gilmour calls attention to the unsatisfactory nature of commercial *ethyl bromide* and gives a series of tests for the same. O. and C. Hehner sound a note of warning with reference to the use of fluorides as butter preservatives, a practice stated to be very prevalent in Brittany, which is strongly condemned. Vanino gives a method for the determination of *formaldehyde* by means of silver nitrate. E. C. Spurge describes a simple and efficient contrivance for centrifugating *immiscible solvents* in the course of analysis, thereby expediting many processes in which they must be employed. B. Sjollem gives a method for determining the iodine in *iodol*. W. Stoeder formulates a method for determining the amount of *glycyrrhizic acid* in commercial liquorice, and also for the assay of *filicic acid* in extract of male fern. G. Denigès gives a method for the destruction of organic matter in the toxicological detection of *arsenic* and other inorganic poisons. P. E. Alessandri gives details of improved manipulation for tests for *phosphorus* in the contents of the stomach. E. Ledié and Quincssen employ sodium peroxide to separate the metals of the *platinum group*. C. Reinhold advocates the employment of *sodium picrate* as a precipitant of *potassium*. E. J. Parry publishes some useful data for the analysis of *shellac*, finding that the Huebl number affords a valuable factor for the determination of the purity or impurity of that substance. F. H. Alcock reports on the purity of *sodium benzoate*. A. Astruc, having stated that *sodium methyl-arsenate* may be directly titrated by alkali, is met with a contradiction by Adrian and Trillat, who consider this method to be unreliable, and employ for the purpose an indirect

silver precipitation process. *S. Portès* finds that *salicylic acid* is a natural constituent of *strawberry juice*. *O. Schmattola* gives a simple flame test for the detection of tin. *Urinalysis* receives the addition of useful tests for *albumin* by *Pollacchi*, *Merck*, and *Sahli*, while *Ruini* employs o-nitrophenyl-propionic acid to detect *sugar* in that secretion.

*H. Causse* employs a solution of crystal-violet in sulphurous acid to detect the contamination of *water* by organic matter.

Essential oils and their constituents have continued to receive much attention. *Star-anise oil* has been examined by *E. O. Douzard*, who gives some valuable analytical data and criticises the official "constants" prescribed in the Pharmacopœia. *F. B. Power* and *F. H. Lees* publish a very complete examination of the oil of *Asarum canadense*.

A new adulterant of *bergamot oil*, pinene mono- or di-hydrochloride, is noted by *S. Gulli*, who also gives the characters of the oil of *bergamot leaves*. *H. von Soden* and *W. Rojahn* describe bergaptin, which they consider to be a new body. *Calamus oil* has been examined by *H. Thoms* and *R. Beckstroem*, who find that it contains *asarone* as well as a high boiling sesquiterpene-alcohol. *Cassia oil*, according to *Schimmels*, still continues to be cunningly adulterated, so that the distillation test, as well as the determination of the cinnamic aldehyde, should be performed. The same authorities have fully examined *cinnamon oil*, naming no less than fourteen of its constituents. *E. O. Douzard* gives the results of his examination of several specimens of this oil. *Citron oil* is reported on by both *H. E. Burgess* and by *S. Gulli*. *Schimmels* have detected dextro-citronellol among the constituents of *Javan citronella oil*.

The presence of *nuthyl-normal-amyl ketone* in *clove oil* is confirmed by the same, who also describe the oil of the resin of *Dacryodes hexandra*. *R. T. Baker* and *H. G. Smith* have considerably extended the knowledge of the constituents of the volatile oils of various species of *Eucalyptus*, the latter author announcing the presence of a new aldehyde, *aromadendral*,  $C_{10}H_{14}O$ , in certain of them. *O. Schreiner* and *E. Kremers* have contributed to the knowledge of the compounds of nitrous acid with *zingiberene*. *A. Hesse* has very thoroughly investigated the formation of the volatile oils of *jasmín* and *orange flowers*. His researches will probably have an important bearing on the processes of manufacture of these oils, since he shows that the products are, in both cases, profoundly modified by the methods



employed in extracting the essential oil from the flowers. *Schimmels* note the adulteration of *lavender oil* with benzoic acid, an addition which may give a poor oil an apparently high saponification figure. They also draw attention to the unsatisfactory nature of the alcohol solubility test for this oil in the Ph. G. IV. *H. von Soden* and *W. Rajahn* have detected *nonyl-aldehyde* and probably *octyl-aldehyde* in *lemon oil*. *G. H. Ogston* and *Moore* publish the summarized results of a great number of analyses of this oil, as well as of the oils of *bergamot* and *orange*. *H. E. Burgess* describes two so-called new constituents of *lemon oil* and *W. A. Tilden* and *H. Burrows* give the results of further work on their *limettin*.

*Menthone* has been isolated by *Tétty* in the oil of *Mentha pulegium*. *J. W. Brandel* and *E. Kremers* record *hydro-thymoquinone* as occurring in the oil of *Monarda fistulosa*. *Roeser* gives a method for the determination of *volatile oil of mustard* by means of silver nitrate. *E. Theulier* furnishes tabulated statements of the results of the examination of last year's *neroli oil*, showing that the rotation was higher than normal, in which statement he is confirmed by *J. Gras*; *Jeancard* and *Satie* also furnish figures for this oil of the same crop and also for *oil of petit-grain*. *E. Theulier* gives the characters of *sweet orange flower neroli*, which differ markedly from those of *neroli bigarade*. *O. Schreiner* finds that the crystalline solid obtained by treating *phellandrene*-containing oils with *nitrous acid*, is not always one substance, that derived from *eucalyptus oil* being separable into two distinct bodies.

*P. Horst* has isolated *persicarol*, a solid camphor from the volatile oil of *Polygonum persicaria*. *H. von Soden* and *W. Rajahn* show that the absence of any marked quantity of *phenyl-ethyl alcohol* in distilled *rose oil* is due to the solubility of that alcohol in water. *E. M. Holmes* has reviewed the botanical and commercial history of *rose oil*, and makes some suggestive remarks, based on practical observation as a rose grower, which, however have been criticised by *E. J. Parry*. The *methyl ester of methyl-anthranilic acid* is found by *Schimmels* to be a constituent of *rue oil* as well as of *mandarin oil*, as previously recorded. *H. von Soden* and *K. Henlé* have continued their research on *Algerian rue oil*, finding that its ketonic contents consist of 60 per cent. of normal *methyl-heptyl-ketone* and 30 per cent. of *methyl-nonyl-ketone*. *H. Seyler* records a new hydrocarbon *salvene*  $C_{10}H_{18}$  in *German sage oil*. *E. Deussen* has detected *dextro-cadinene*

in the low-boiling fractions of *West Indian sandal oil*. A. and P. *Androuard* state that American turpentine oil is largely adulterated with a specially-prepared hydrocarbon oil known as "white spirit." E. *Theulier* compares the characters of *vetiver oil* distilled in Grasse, from dry material, with that obtained in Réunion from fresh roots. G. *Darzens* finds that *ylang ylang oil* contains *methyl alcohol*, while *para-cresol* is present among the phenolic contents. This is probably present in the oil as *acetyl-paracresol*; *iso-eugenol* is also present with *eugenol*, and the benzoic and salicylic esters of methyl and benzyl alcohols. Benzyl alcohol is shown to be present in the free state also by H. von *Soden* and W. *Rojahn*. E. *Dowzard* joins hands with E. J. *Parry* and *Schimmels* in giving a lower specific gravity for clove oil than the limits of the Pharmacopœia. A. *Verley* and F. *Bocking* give a method for the determination of *alcohols and phenols* in essential oils, by esterifying them in the presence of pyridine, the amount of free acid after the completion of the esterification being determined by difference. Applying this method to the determination of *eugenol* in *clove oil* they obtain results which are claimed to be more accurate than the *potash absorption* method of J. C. *Umney* or the *benzoyl-eugenol* method of *Thoms*. By employing a weaker alkaline solution than that recommended by *Umney* they obtain figures, however, which appear to compare favourably with those of their pyridine esterification process. C. *Mann* publishes a method and describes an apparatus for the determination of *essential oils in drugs*, and modified, for the same purpose, in perfumes, liqueurs and soaps. E. *Charabot* and A. *Hébert* consider that *esters* are formed in plants by the direct union of alcohols and acids under the influence of some specific dehydrating ferment. They also find that the presence in the soil of certain salts, notably sodium chloride and nitrate, tends to increase the amount of esters in the case of *peppermint*, while the amount of moisture in the living plant is lessened.

Marked advance has been made in the study of the alkaloidal constituents of drugs, although no great number of new alkaloids have been isolated, and none that are likely to play an important part in medicine, yet the work done by different investigators has been correlated, and in some instances conjoint research on closely allied plants has yielded important results. The members of the N.O. *Papaveraceæ* have attracted much attention. *Protopine* has been found to be most widely distributed

in plants of that order. *Sanguinaria canadensis* is found by *R. Fischer* to contain *chelerythrine*, *sanguinarine*, *homochelidonine*, the last occurring in two isomeric forms, and *protopine*. *Glaucium luteum* has yielded the same author *glaucine*, *protopine*, *chelerythrine* and *sanguinarine*; and *Eschscholtzia californica*, *protopine*, *homochelidonine*, and probably traces of *sanguinarine* and *chelerythrine*. *Chelidonium majus* is found by *E. Schmidt* to contain *chelidonine*, *homochelidonine*, in two forms, *sanguinarine* *chelerythrine* and *protopine*. *J. O. Schlotterbeck* states that *Argemone mexicana* does not contain morphine, while the so-called argemoneine is identical with *protopine*. *J. O. Schlotterbeck* and *H. C. Watkins* find that *Stylophorum diphyllum* contains *chelidonine*, *stylophine*, *protopine*, *diphylline*, *sanguinarine* and what was at first considered to be *chelidoxanthine*, but which ultimately proved to be *berberine*. *J. Gadamer* directs attention to the close analogy which exists between the alkaloidal constituents of the plants of the closely-allied orders *Papaveraceæ* and *Fumariaceæ*, notably the close resemblance between the bases of *Corydalis cava* and those of *Papaver somniferum*. He has, moreover, detected *protopine* in the roots of *Dielytra spectabilis*. *H. M. Gordin* has directed his attention to *berberine*, and notes some peculiar properties of that base, which have occasioned previous workers to fall into error in its quantitative determination. He gives methods by which it may be detected and estimated. *A. Heffter* amplifies his work on the *cactus alkaloids*, and ascribes the presence of *pellotine* in commercial "mescal buttons" to an admixture of the flower buds of *Anhalonium williamsi* with the true drug, *A. lewinii*. *G. Heyl* records two new cactus alkaloids, one from *Pilocereus sargentianus*, *pilocercine* amorphous and toxic, the other from *Cereus pecten-aboriginum*, *cercine*, also amorphous, but forming crystalline salts. *W. Lohmann* has recorded the presence of an easily crystallizable alkaloid in the root of *Collinsonia canadensis*, but *H. M. Gordin* states that this supposed base is merely magnesium phosphate. *F. B. Ahrens* has isolated several bases from the residues of *conine* manufacture. *Thoms* finds *alantoine* in *Cordia excelsa*. *O. Hesse* contributes a further communication on *hyoscine* and *atrosine*, and deprecates the coining of new names by other workers for well-established alkaloids; the same author discusses at length the alkaloids of *mandragora* root, which he states to be *hyoscyamine*, *hyoscine*, *pseudo-hyoscyamine* and *mandragorine*. *Pilocarpine* and its derivatives have been further investigated by *H. A. D. Jowett* and by *A. Pinner* and *R. Schwarz*. The latter are now in close agreement

with the English investigator on most of the previously disputed points. *F. Malméjac* has found an alkaloid, *sambucine* in *elder bark*. A new base, *ibogaine*, has been isolated by *E. Landarin* and *J. Dybowski* in the bark and roots of *Tabernanthe iboga*. *A. Haller* and *E. Heckel* have also found another unstable base in *iboga*, but the botanical identity of the drug examined by them and by the first-named authors is doubtful. *T. E. Thorpe* and *G. Stubbs* give a method for the isolation of *taxine* from the shoots of *Taxus baccata*. *Arnold* and *Behrens* describe the distinctive reactions which differentiate *yohimbine* from cocaine.

Among the many processes published for the alkaloidal assay of drugs and their preparations may be noted that of *W. Stoeder* for the determination of total bases in *pomegranate bark*; *F. H. Alcock's* method for the assay of liquid extract of cinchona; *F. de Myttenaere's* process for determining the alkaloidal value of *cinchona bark*, and *O. Schreiber's* method for the assay of *hydrastis root*. *H. Écalle* has advocated the use of *silicotungstic acid* as a precipitant of "aconitine" from galenical preparations of aconite, but since the purity of the alkaloidal precipitate thus obtained has not been established, the process cannot be regarded as possessing much value. *J. Warin* gives a method for the assay of *kola nut* and its galenical preparations.

*A. Tschirch* and his pupils have investigated a further number of *resins*, including those furnished *Altingia excelsa*, known as *Malay storax*, also *Oriental storax*, *American storax*; *Manila*, *Yucatan* and *African elemis*, and the resin of *Dammara orientalis*. They have also reported on a specimen of the oleo-resin of *Picea vulgaris*, from *Kronstadt*, with results which indicate that this resin is derived from a different botanical source from that previously examined by them. *E. Kcto*, employing the method of *Tschirch*, has examined the various *copaiba resins* with interesting results. *W. Fahrion* finds *sylvicic acid* to be the chief constituent of *American colophony*. *T. A. Henry* thoroughly deals with the chemistry of sandarac resin, isolating from it *inactive pimaric acid*, and an amorphous resin acid, *callitric acid*, which forms crystalline deliquescent salts.

*Artemisin* has been investigated by *M. Freund* and *L. Mai*, also by *P. Bertolo*, who agree mainly as to its formula and general characters. *E. Bourquelot* and *H. Hérissey* announce the isolation of a new glucoside, *aucubin*, from the seeds of *Aucuba japonica*. *E. Léger* has reviewed his previous work on *aloes* and the *aloins*; finding that *barbaloin* is present in all aloes except those of *Natal*

he suggests that the name should be altered, since the prefix "barb" is misleading. He publishes tests for the detection and differentiation of the various aloes, and records the results of observation of the action of sodium peroxide on aloin. *Saponins* have been isolated from the seeds of *Verbascum sinuatum*, *V. phlomoides* and *V. thapsiforme*, by L. Rosenthal; from *Guaiacum officinale*, by E. Paetz; from *Cereus gummosus*, to the extent of 24 per cent., by G. Heyl. The so-called soluble starch of *Saponaria officinalis* is found by G. Barger to be a new glucoside, *saponarin*. *Rhododendron chrysanthum* has given von Archangelski three new glucosides—*rhododendrol*, *rhododendrin* and *andromedotoxin*. E. Bourquelot publishes a new method for the detection of glucosides, and sucrose, in vegetable tissues by means of invertin; the application of this process has already led to the isolation of sucrose and new glucosides in several plants, and promises to yield further interesting results.

G. Bertrand has isolated the blue colouring matter, *boletol* from various species of *Boletus*. *Excacaria glandulosa* is found by A. G. Perkin and S. H. C. Briggs to contain two crystalline colouring bodies, *excacarin* and *jacarandin*. E. Kleerekoper obtains two new colour bodies from the purple wood of *Copaifera bracteata*, *pharvin* and *pharvecin*. *Digitoflavone* is shown by H. Kiliani and O. Mayer to be identical with luteolin. The former author has thoroughly examined the *digitalin* of German commerce and finds it to contain four glucosides, *digitoxin*, *digitonin*, *digitalin* and *digitalicin*, and he further modifies his method of obtaining *digitogenin* from digitonin by hydrolysis. Heckel and Schlagdenhauffen find *pseudocoumarin* in *Dorstenia klaineana*, but not in other species of *Dorstenia*. *Couso* has been examined by A. Lobeck, who has isolated from it  $\alpha$ - and  $\beta$ -*cosin*, *cosotoxin*, *protocosin*, and *cosidin*, the first two constituents being obtained by fractional crystallization from Merck's *cosin*. Hans Molisch has discovered a new source of coumarin in *Peristrophe angustifolia*, in which it is probably formed, as in other coumarin-yielding substances, by the action of a specific ferment. N. Kromer has reported on the molecular constitution of *jalapin*. A. Hubert finds that *Isano oil* contains a new fatty acid, *isanic acid*, which is a powerful purgative. The chemistry of *cacao butter* has been further elucidated by J. Klimont, who has isolated from it a compound glyceride of one molecule each of oleic, palmitic and stearic acids, and points to the possible presence of other similar compound glycerides. Molisch and Goldschmeidt find that *Scutellaria altissima*, as well as other members of the genus, contains

a new compound, *scutellarin*, which is decomposed by dilute acids forming *scutellarein*, but no sugar; fumaric and cinnamic acids are also present in the plant.

*T. E. Thorpe* and *J. Holmes* announce the presence of two paraffins, *hentriacontane* and *heptacosane*, in tobacco. A new alkaloid, *anonaceine*, is recorded by *Roche* as occurring in the fruits of *Xylopia ethiopica*. The bark of *Piscidia erythrina* has been reinvestigated by *P. C. Freer* and *A. M. Clover*, with the result that the so-called *piscidin* is found not to be a simple body, but a mixture of two crystalline substances. The bark also contains the soluble lime salt of *piscidinic acid*, while another crystalline body, distinct from the above, is removed by extraction with petroleum ether. *F. von Hemmelmayr* reports on *ononin*, the glucoside of *Ononis*, which is shown to consist of two substances, *ononin* and *onon*, the decomposition products of which are fully described. *F. B. Power* and *F. Sheddon* have continued their researches on the derivatives of *gallic acid*, and describe *ethyl dinitro-diacetyl-gallate*, *ethyl dinitro-triacetyl-gallate*, *ethyl mono-amido-gallate hydrochloride*, *diazo-ethyl-gallate*, and *ethyl diamido-gallate hydrochloride*. *H. Moissan* has succeeded in producing *potassium formate* by heating potassium hydride in carbonic acid gas or carbon monoxide, from which salt the acid may be liberated in the usual way. *G. Garrozi* has obtained *cinchonine sulphocarbolate* by the interaction of cinchonine sulphate and barium sulphocarbolate; it is stated to be a useful prophylactic against malaria. *Marcel Guerbet* has synthesized *butylic alcohol* by the prolonged heating of barium ethylate with ethylic alcohol.

Among the organic metallic salts recently prepared in a state of purity for medicinal use, may be noted the *mercury tannate* of *Zdarek*, which is more definite in composition than the commercial article; the *bismuth gallate* of *P. Thibault*, who gives a process for the production of a crystalline salt of definite composition; and the same author's *bismuth salicylate*, also a definite crystalline body. *L. Prunier* points out that these organic salts of bismuth may, like those of antimony, be classed into two groups. Of these, one is comprised of true salts, such as the citrate, lactate and malate; the other includes those which have acid characters, combining with alkalis, being, in fact, analogous to the "emetic" type of antimony compounds. Such are *bismutho-gallic acid* and *bismutho-tartaric acid*. *A. and L. Lumière* and *F. Perrin* give a method for the preparation of *glycero-phosphorous acid* and its salts, by means of glycerin and phosphorus trichloride.

The practical application of the discoveries of physiological chemistry continues to lead to important results. *J. Takamine* describes in detail the method of preparing adrenaline from suprarenal capsules. *F. Kutscher* throws further light on the action of the ferments of the *thymus gland*. A toxic albuminoid, called, from its peculiar action, *hypnotoxin*, has been isolated from the stinging tentacles of marine Coelenterata by *P. Portier* and *C. Richet*. *M. Javillier* points to the occurrence of a milk-curdling enzyme in the juice of many of the commonest plants. *R. Dubois* finds that the development of the purple colour in the colour-gland of the shellfish *Murex brandaris* is brought about by the presence of an organized ferment of relatively large size. *J. Bougault* finds that the juice of *Russula delica* is capable of oxidizing morphine into oxymorphine, suggesting that possibly a similar action may take place, by the action of the oxidizing ferments of the body, when morphine is administered medicinally. *O. Cohnheim* finds that the intestines secrete a specific ferment, which is very active on peptones and proteoses, and *Osborne* and *Campbell* have found that egg albumin consists of *ovomucin*, *conalbumin*, *ovomucoid* and *ovalbumin*.

In recent *Materia Medica*, although numberless synthetic remedies have continued to be produced, it cannot be said that many of the introductions of the past year promise to retain a lasting place in pharmacopœdics. Commercial enterprise is, generally speaking, concerned in their production more than the scientific application of chemical therapeutics. A special development of this has been shown in the direction of artificial foods, in which the tendency appears to be rather to find an outlet for by-products than to furnish really valuable preparations. In consequence, bodies of this class must be regarded with suspicion until their actual value has been proved.

Among the synthetic remedies which appear to possess some value may be noted "*Acoine C*" of *Trolldenier*, di-para-anisyl-mono-para-phenyl-guanidine hydrochloride, which combines anæsthetic and bactericidal properties. *Agurine*, a combination of sodium-theobromine and sodium acetate, stated by *Michaelis* to be more useful than the closely allied diuretine. *Albargin*, a gelatin silver compound found by *Bornemann* to be more efficacious than protargol. *Asperin*, acetylo-salicylic acid, said to be supplanting the salicylates in the treatment of rheumatism. *Aristoquinine*, diquinine carbonic-acid ester, introduced by *H. Dreser* as a relatively tasteless form of that alkaloid. *Anesthesine*, ethyl-

para-amido-benzoate, as its name implies, an analgesic *Atoxyl*, the anilide of metarsenic acid, presenting the constituent arsenic in a relatively non-toxic form

*Calcium glycono-arsenate* has been recommended as a convenient means of exhibiting glycono arsenic acid *Calcium glycerophosphate* is stated to be useful in enuresis as well as a nervine tonic, for the latter purpose it is still widely prescribed on the Continent *Camphoric acid*, originally introduced as an anhydrotic, is found to possess valuable antiseptic properties in cystitis and other urinary affections *Chinin*, bismuth quinoline rhodinate, has found useful application in the treatment of gonorrhœa *Cupriargol*, a compound of copper with nucleinic acid, has been introduced as an ophthalmic drug *Disodic methyl arsenate*, "ariheul," which is closely related to sodium cacodylate, has been introduced by *A. Gautier* as a remedy in paludal fevers *Eucaine acetate* is recommended as a substitute for the hydrochloride, on account of its greater solubility *Glyconic acid* is considered by *Schwarz* to be of extreme value in the treatment of diabetic coma *Glycosal*, glyceryl monosalicylate, is claimed to possess all the therapeutic value of salicylic acid and its salts, without its drawbacks *Ibat*, a bismuth iodine tannin compound, is one of the many substitutes for iodoform *Ichthargan* is stated to be gaining ground as a general sedative antiseptic *Iodocol*, a combination of guaiacol and iodine, has given good results in the treatment of tuberculosis, bronchitis, and other affections of the lungs *Lithium salolophosphate* is an antithermic, antacid and diuretic it is also known as salvosol lithium *Magnesium cacodylate* is recommended by *Burlincaux* for subcutaneous injection in a similar manner to the sodium salt Under the name of *mentholol*, a compound of menthol and p-chlorophenol has been employed by *Lejude* as an application in tuberculosis of the larynx Although *mercuric cacodylate* has been found unsuitable for medicinal use, on account of its high toxicity, the *iodo-cacodylate of mercury* has been used with success by *Chavette* and *Fraisse* in the treatment of syphilis *Pneumin*, a product of the action of formaldehyde on creosote, has been useful in the treatment of phthisis Nearly allied to it is *Pulmoform*, obtained by the action of formaldehyde on guaiacol *Purgatin*, anthrapurpurine acetate, is a tasteless aperient *Pyramidon bicamphorate* is introduced as being both antithermic and anhydrotic *pyramidon monacamphorate* is less soluble and does not so markedly diminish perspiration as the first-named salt



*Pyramidon salicylate* resembles the other salicylates in its action. *Rheumatine*, salicyl-quinine salicylate, is a new remedy for acute articular rheumatism; similar to it is *saloquinine*, or quinine salicylic ester. *Sodium phenolo-sulphoricinate* has given good results in the treatment of ozæna. *Thymatol*, thymol carbonate, is recommended as a substitute for thymol for internal administration on account of its relative want of taste and odour. *Triferrin*, iron para-nucleinate, is stated to be a useful and convenient chalybeate preparation for administering iron in large doses. *Valyl*, valerianic acid diethyl-amide, is suggested as affording a definite compound for the administration of valerianic acid, and therefore a useful substitute for valerian root. *Vioform*, iodo-chloroxy-quinoline, another iodoform substitute, is favourably reported on by *Krecke*.

*Mendel* has employed *thymus gland* with the best results in the treatment of over a hundred cases of rickets. *Thebaine hydrochloride* is stated by *Velico* to be valuable in the treatment of neurasthenia. *Jaur* has proved, in the treatment of over five thousand infants, that *silver acetate* is preferable to silver nitrate as a prophylactic against infantile ophthalmia. *Sodium succinate* is found to be valuable in catarrhal jaundice. *Garlic juice* is one of the most recent remedies receiving medical recognition as a remedy for tuberculosis and lupus, although it has long enjoyed a popular reputation in certain localities for its efficacy in these affections. *Oil of Atlas cedar* is now stated to excel sandal oil as a remedy for gonorrhœa, and has given good results in bronchitis and in tuberculosis.

Among the new vegetable drugs the most important is probably *Cassia bearcana*, traced to its botanical source by *E. M. Holmes*, and found by *O. Sullivan Beare* to be a specific in black-water fever. *L. Benlaygue* suggests the use of the resin of *Calystegia soldanella* as a substitute for scammony resin. *Kosam*, a Chinese remedy for dysentery, has been identified by *E. Heckel* and *F. Schagdenhauffen* as being the seeds of *Bruccea sumatrana*. It has been chemically examined by several investigators, and *Mougeot* has confirmed its value in over eight hundred cases of tropical dysentery. *Lamium album* is found to be useful in arresting hæmorrhage; the fluid extract of the berries of *Pyrus aucuparia* affords a pleasant and effective laxative. The fruits of *Casimiroa edulis* are suggested by *Merck* as being worth investigation, since the drug possesses marked therapeutic properties. *Muirea puama*, a Brazilian drug, is an aphrodisiac, and

has been examined by *T. Peckholt*. The seeds of *Fovillea cordifolia* are stated by *R. Brown* to have antidotal properties to snake poison as well as being purgative, febrifugal, and emetic. The flowers of the common daffodil afford, when infused, a safe and useful emetic. *Olutkumbul*, the dried bark sap of *Abroma angustum*, is found to be a valuable remedy in menstrual disorders.

Substitutions and adulterations of drugs continue to tax the vigilance of pharmacists. A serious case of substitution, stated to be prevalent on the Continent, of the flowers of *Spartium junceum* for those of *Sarothamnus scoparius* is recorded by *E. Perrot*. Pepper adulterated with the fruits of *Myrsine africana*, and of *Embelia ribes* has been met with by *A. Mennechet*. The leaves of *Phytolacca decandra* have been found by *C. Hartwich* mixed with those of *Atropa belladonna*. *Vanilla* pods covered with benzoic acid to give them a fictitious appearance of value, are noted by *H. Lecomte*.

*W. S. Cliffe* notes the superiority of *Xanthoxyllum clavaherculis* over *X. americanum*; although both are official in the U.S.P. as "prickly ash," only the former should be used in medicine. In consequence of the frequent occurrence of cases of poisoning with the common riverside plant, *Ænanthe crocata*, *E. M. Holmes* has published a minute description, with illustrations, of this dangerous umbellifer.

*F. H. Alcock* has detected an adulterant of *calumba* root from the abnormally high ash left by it on incineration. *W. H. Lenton* has determined the normal ash content of *capsicum* fruits. *L. Glaser* gives the amount of ash found in various leaf drugs, both whole and powdered.

The microscopical features of *Capsicum minimum* are minutely described and illustrated by *T. E. Wallis*. *H. Kraemer*, in a suggestive paper, points out the diagnostic value of the plant-crystals in the microscopic examination of drugs.

*Solanine* has been isolated in *Solanum chenopodium* by *C. E. Sage*. The drug is stated to be a remedy in dysentery. *A. Barilli* describes a new pepper, *Piper famenchoni*, and gives its chief constituents. *J. Rutherford Hill* reiterates his statement as to the presence of copper in *nux vomica* seeds, having detected the metal again in fresh *Strychnos* fruits, imported from India.

*Boehm* has further minutely examined extract of male fern, and isolated its chief constituents. *D. B. Dott* gives a method for the determination of glycyrrhizic acid in liquorice root. *K. Dieterich* publishes an improved method for the determination of

*cantharidin* in *cantharides*. *T. S. Barrie* gives the properties of commercial *hamamelin*. *L. Ough* describes the process for the preparation of *resinoid hydrastin*. *E. M. Holmes* finds that in order to obtain a sharp reaction 80 per cent. sulphuric acid should be employed in the official colour test for *Strophanthus* seeds. *H. G. Greenish* criticizes the official tests for *myrrh*, and suggests improvements. *W. Stodder* gives an improved method for the assay of *opium*. Since *colchicum* seeds are found to be richer in alkaloid than the corms, *L. Schultze* suggests that they alone should be employed in pharmacy, and that the latter should cease to receive official recognition. *D. Hooper* reports on two Indian geranium roots, *G. nepalense* and *G. wallichianum*, which, containing much tannin, might find use in medicine. The same author, in conjunction with *G. Watt*, describes the peculiar properties of the fixed oil of the seeds of *Carthamus oxycantha*.

In practical pharmacy *P. Schwarz* gives the methods of preparing solutions of *asterol*. *E. Thibault* discusses the action of alcohol on *pepsin*. *G. F. Merson* suggests amendments in the formulæ for *Collodion belladonna*, B.P.C., and for *Emplastrum Belladonna viride*, B.P.C. *E. A. Andrews* publishes a modification of the official process for the preparation of *Extractum belladonna*, and *W. Stodder* gives a simple test for distinguishing between the extracts of *belladonna* and of *hyoscyamus*. *W. Duncan* improves the method of preparing *bismuth citrate* and its ammoniacal solution. *A. Hegland* describes the method of preparing *calcium sulpho-ichthyolate*, a tasteless and odourless compound of ichthyol. *G. F. Merson* criticizes the official extract of *Indian hemp*, and suggests that ether, or absolute alcohol, should be substituted for the extraction menstruum, alcohol 90 per cent. at present used. The cause of the deterioration of galenical preparations of *Indian hemp* is discussed by *E. M. Holmes* and *C. W. Marshall*, while *J. Humphrey* contributes a useful résumé of the chemical literature of the drug. *W. Lyon* condemns the use of glycerin in *Unguentum acidi carbolici*, and gives an improved formula for its preparation. The same author considers that the green compound tincture of *chloroform* and *morphine* does not replace *chlorodyne* in medical practice. He suggests a formula, which, under the name *Liquor chloroformi compositus*, would probably be more acceptable. *W. Garsett* gives details of a method for the alkaloidal assay of *coca* preparations. *W. Lyon* suggests a modification of the formula for *compound pill of colocynth and hyoscyamus*. A very complete treatise on the

*preparation of compressed tablets* appears in the *Pharmaceutical Journal* from the pen of an anonymous author. *J. Gordon Sharp* suggests a fermentation test to determine the therapeutic activity of *tincture of digitalis*, and states that the preparation is more stable than is generally considered. The *Antwerp Pharmaceutical Society* have published an Unofficial Formulary, selections from which, likely to be of interest to British pharmacists, are given. *G. Roe* contributes a practical note on the subject of *pill excipients*, which is always of interest, suggesting the employment of gelatin as a binding material. *W. Lyon* adversely criticizes the use of syrup of glucose for the preparation of pill of aloes and myrrh, and of compound pill of galbanum. *H. G. Greenish* and *W. H. Lenton* advocate cold maceration for the preparation of *extract of gentian*.

*Merck* gives useful formulæ for the compounding of *glycosal* preparations; also for those of *glycogenal* and *lecithin*. *F. Goldmann* describes the manipulative details necessary to obtain satisfactory solutions of *protargol*. *M. Adrian* gives a very practical paper on the preparation of *medicated granules*, an elegant form of dispensing drugs which has attained wide popularity in Continental pharmacy. *John Barclay* suggests the use of the fresh herb for the preparation of *tincture of hyoscyamus*. *J. P. Gilmour* notes the *incompatibility* of magnesium sulphate, phenazone and salicylic acid. *E. Bourquelot* gives details for the preparation of *iodised cotton*. The pharmacy of *iodoform* is fully treated of by *E. Desesquille*. *W. Lyon* suggests a slight modification in the formula of the official *iron pill*; the same author advocates modifications in the formulæ of *ointment of red mercuric oxide*, and of *ammoniated mercury*, also of *syrup of orange flowers*, in which he is supported by *A. C. Abraham*, and of *resin ointment*, *tar ointment*, *zinc oleate ointment*, *tartarated iron*, and *ammoniated tincture of valerian*. A compound of manganese with sugar is obtained by *F. Gouillon* from the action of potassium permanganate on sugar, in the cold. *Sir James Sawyer* recommends the employment of *white liquorice paste* as a basis for certain medicinal lozenges. *H. G. Greenish* and *F. A. Upsher Smith* have investigated the cause of change on keeping of *solution of mercuric chloride*. The same authors have also experimented on the preparation of *fluid extract* and *tincture of nux vomica*, recommending certain modifications of the official formulæ, and removing the fatty matter. They have also completed a long series of experiments for the determination of the *solubility* of

certain official *chemicals* in water. *P. W. Squire* finds that *mercuric nitrate ointment* prepared according to his method has better keeping properties than that made in accordance with the official directions. *Dr. Chalmers Watson* has published a method for the preparation of *myelocene*, or bone marrow, for use in deafness arising from middle ear disease. *F. A. Sicker* applies his paraffin method for removing fat from *nux vomica extract* to the same purpose in the case of *fluid extract of nux vomica*. *F. H. Alcock* notes the presence of *sulphates* in *tincture of opium*; *W. H. Martindale* shows that phosphorus, properly compounded, in pills, in combination with alkaloids, does not occasion any decomposition of the bases; the phosphorus, also, in the case where it is combined with zinc valerianate and with nitro-glycerin, does not become unduly oxidized. The preparation of *suppositories* is discussed by *L. F. Stevens*, *Meistermann*, and *Crouzel*. *P. Antoine* gives practical details for preparing pills of thyroid gland.

In the collection of formulæ, selection has been made of such as may be useful to the working pharmacist in the many directions in which his services are required by the public; although many of these cannot be regarded as strictly pharmaceutical, it is hoped that they may be useful, or, at least, suggestive.

In conclusion we have to tender our thanks to the Editors of the *Pharmaceutical Journal* and the *Journal of the Society of Chemical Industry*, respectively, for the loan of blocks illustrating the papers of *E. C. Spurge* and *C. Mann*.



**CHEMISTRY.**





# YEAR-BOOK OF PHARMACY.

## PART I.

### CHEMISTRY.

**Acetone and Hypophosphorous Acid, Three Combinations of.**  
C. Marie. (*Comptes rend.*, **134**, 219.) By the prolonged boiling of crystallized hypophosphorous acid with acetone, the boiling point of the mixture is gradually raised, and it becomes viscous and brown. On cooling, a deposit of crystals is formed, which are collected, washed with acetone, the washings being added to the mother liquor and again boiled for some days, when a fresh crop of crystals is obtained. They are washed with cold acetone, then recrystallized from boiling alcohol. They then melt at 180–181°C. and are found to have the composition  $C_6H_{15}O_4P$ . This is a monobasic acid, forming salts which appear to belong to the monoclinic series, giving crystals which are very delicate, easily splitting into laminae or thin filaments. From the mother liquor, after removing these crystals and distilling off excess of acetone, two other acids may be separated; it is treated with water and saturated with lead carbonate. The neutral filtrate from the precipitate formed is concentrated on the water bath until it sets to a vitreous mass on cooling. This is powdered and dissolved in boiling alcohol, to which a little water is added to complete solution. On cooling, crystalline crusts of the soluble lead salt are formed, from which the Pb is removed by means of  $H_2S$ . The filtrate from the  $PbS$ , evaporated *in vacuo*, crystallizes in white very hygroscopic crystals, melting at about 40–41°C. and forming amorphous salts. It has the formula  $C_3H_9O_3P$ . The insoluble lead precipitate separated as above gives, when suspended in water and decomposed with  $H_2S$ , another acid  $C_3H_9\bar{O}_4P$ , which,

when recrystallized from acetic acid, melts at 169–170°C. This is a dibasic acid.

**Aconitine, Determination of, in Galenical Preparations.** H. Ecalle. (*Journ. Pharm. Chim.* [6], 14, 97.) The following method for determining the value of various aconite preparations is advocated, but it will be noted that the author does not in any way establish the identity of his alkaloidal compound with true aconitine. The chief interest in the note lies in the widely discrepant figures for alkaloid in various articles examined, showing a great variability in the basic constituents of these potent preparations. A known weight of tincture or fluid extract, say, 125 Gm., is evaporated on the water-bath until the alcohol is dissipated, and, when cold, acidified with 10 c.c. of N/10  $\text{HNO}_3$ . The mixture is then introduced into a separator and treated with 100 c.c. of ether and 4 c.c. of ammonia. After separation, the alkaline liquor is shaken out with successive quantities of ether until no alkaloidal reaction is obtained with a drop of the ether washings with Mayer's reagent. The ethereal extract is then shaken out first with 7 c.c. of 10 per cent.  $\text{HNO}_3$ , and then with water, until all the alkaloid is removed. The bulked watery solutions are then warmed to drive off the ether, cooled, acidulated with 12 to 15 c.c. of 10 per cent.  $\text{HNO}_3$ , and the alkaloid precipitated with an excess of 7 or 8 c.c. of a 5 per cent. solution of silicotungstic acid. The mixture is heated on the naked flame until boiling commences. It is then set aside for twenty-four hours for the precipitate to subside. The precipitate is then collected, washed free from acid with water, dried, and finally incinerated in a tared porcelain crucible. The weight of the residue  $\times 0.793$  gives the amount of "aconitine" in the quantity of the preparation taken. The examination of trade specimens of preparations of aconite shows that they vary very widely in alkaloidal value. Thus three alcoholatures of the leaves contained 0.294, 1.105 and 0.393 per mille. Three root alcoholatures gave 0.921, 1.665 and 1.007 per mille. Solid leaf extracts gave 0.428, 0.570 and 0.333 per cent. of alkaloid and root extract 0.951, 1.562 and 3.901 per cent.

**Adrenaline.** Jokichi Takamine. (*Amer. Journ. Pharm.*, 73, 523.) To isolate the base finely disintegrated supra-renal capsules are macerated in water or very dilute acid for about 5 hours at 50°–80°C. with frequent agitation, the volume of the water being kept up, as it is lessened by evaporation. The mass is then heated to 90–95°C. for one hour to coagulate albuminoids. Since

the base is prone to absorb atmospheric oxygen, contact with air must be avoided as much as possible. The layer of fat which forms on the surface of the maceration liquid partly effects this; a further safeguard may be secured by conducting the maceration in an atmosphere of  $\text{CO}_2$ . The solid matter is then strained out, pressed, and again macerated in slightly acid water. The aqueous acid extracts are bulked and allowed to separate from the fat, then evaporated *in vacuo*. To the residue three times its volume of alcohol, or wood spirit, is added. The alcoholic extract is separated, and the organic precipitate washed with alcohol. The alcoholic extract and washings are then evaporated *in vacuo*, the residue is treated with ammonia, to a distinctly alkaline reaction, and left for several hours. A yellowish brown precipitate of impure adrenaline will then be formed. It is collected, washed and dried. The product is dissolved in dilute acid and treated with a mixture of ether-alcohol. A precipitate of brown organic matter and inorganic impurities is thus obtained, which is filtered out. The filtrate is then treated with ammonia, when the adrenaline will be liberated in a pure condition. Fixed alkalis may be employed in the above process instead of ammonia, but care must be taken that they be not added in excess, since adrenaline is soluble in both caustic potash and caustic soda solutions. Adrenaline thus obtained has the composition  $\text{C}_{10}\text{H}_{15}\text{NO}_2$ . It occurs as a micro-crystalline powder, of varying shaped crystals, according to the menstruum from which it has been crystallized. It forms either prisms, fine needles, rhombic plates, boat or leaf-shaped crystals, or wart-like masses. It is faintly alkaline to litmus and to phenolphthalein. It is sparingly soluble in cold water, but dissolves more readily on warming. In the dry form it is perfectly stable, but in aqueous solution is prone to absorb oxygen, becoming coloured. Ferric chloride gives a green colour reaction with the base, and iodine a pink tint. The green solution obtained with ferric chloride gives various colours, from purple to carmine, when treated with caustic alkali. Its aqueous solutions reduce gold chloride. It is not precipitated by many of the usual alkaloidal reagents. The salts of adrenaline have not yet been obtained in a crystalline condition.

The physiological properties of adrenaline are remarkable. A fraction of a drop of a 1:50,000 aqueous solution of adrenaline or its salts blanches the normal conjunctiva in one minute. It has a marked influence in raising the arterial tension when administered as an intravenous injection in extremely minute doses. It

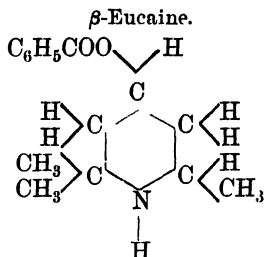
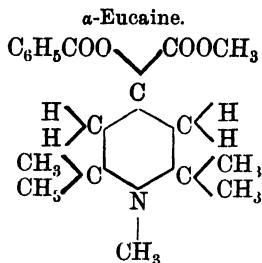
is the most powerful of known hæmostatics when applied locally. It is non-toxic, non-irritant and without cumulative action. It will probably be found to be serviceable as an antidote, by hypodermic injection, in cases of opium poisoning and in preventing collapse in anæsthesia.

**Albumin, Egg, Chemistry of.** Osborne and Campbell. (*Pharm. Centralh.*, **72**, 381.) Ovalbumin is the chief constituent of egg albumin. Fifty per cent. was obtained in a crystalline form, while the greater part of the residual albumin also consists of this body. Its aqueous solution is turbid at 60°C. and coagulates at 64°C. It is a combination of a protein with an acid containing a carbohydrate group. Besides this, the chief proteins of egg albumin are ovomucin, conalbumin and ovomucoid. Ovomucin is the glycoprotein recently isolated by Eichholz, and is only present in small amount. After washing with alcohol and drying, it forms a light, white powder, partially soluble in sodium chloride solution, yielding a non-viscous fluid which becomes turbid at 75°C. and forms flakes at 78°C., but dissolves on boiling, separating out again as the solution cools. Conalbumin closely resembles this, but coagulates at a lower temperature. Ovomucoid is left after all the albuminoids coagulable by heat have been removed. It is identical with the pseudopeptone of Neumeister and the glycoprotein of Moerner.

**$\alpha$ - and  $\beta$ -Eucaine, Identification and Properties of, and Distinction of from Cocaine.** C. L. Parsons. (*Journ. Amer. Chem. Soc.* **23**, 885.)  $\alpha$ -Eucaine, first synthesized by G. Merling from triacetoneamine through triacetoneamincyanhydrin to triacetonealkaminicarbonic acid, which, by the action of benzoyl chloride and subsequent action of methyl iodide in caustic potash solution, becomes *n*-methylbenzoyltetramethyl- $\gamma$ -oxypiperidinecarbonic acid methylester or " $\alpha$ -eucaine." This, when treated with hydrochloric acid, acts like other alkaloids forming a hydrochloride, in which form it is prepared and sold.

$\beta$ -Eucaine was discovered by A. Schmidt and G. Merling, and was obtained by purifying the vinylacetonealkamine of Fischer and substituting a benzoyl group for the hydrogen atom of the hydroxyl. Thus " $\beta$ -eucaine" or benzoylvinyldiacetonealkamine, is also an alkaloid which, when treated with hydrochloric acid, forms the hydrochloride.

It will be seen from the structural formulæ of  $\alpha$ - and  $\beta$ -eucaine that they have a close relation to cocaine and to tropacocaine.



The hydrochlorides of both bases have analgesic power equal to that of cocaine, while they are less toxic;  $\beta$ -eucaine, in particular, being six times less toxic than cocaine. Solutions of the salts of both may be boiled without decomposition. It is stated that injections of  $\beta$ -eucaine are followed by less smarting and irritation than those of  $\alpha$ -eucaine, and that therefore only  $\beta$ -eucaine is supplied when merely "eucaine" is ordered.

The free bases are readily shaken out with the usual immiscible solvents; ether and light petroleum ether are most suitable for the purpose.  $\alpha$ -Eucaine melts at  $103^{\circ}\text{C}.$ ;  $\beta$ -eucaine at  $91^{\circ}\text{C}.$ ; cocaine at  $98^{\circ}\text{C}.$ ;  $\alpha$ -eucaine hydrochloride melts, with decomposition, at about  $200^{\circ}\text{C}.$ ;  $\beta$ -eucaine hydrochloride at  $268^{\circ}\text{C}.$  The solubility of the former in water is about 1:10; the latter is much less soluble, only about 3:100. This comparative insolubility readily distinguishes the salt from cocaine hydrochloride.

*Reactions characteristic of  $\alpha$ -Eucaine salts.* Potassium iodide (1:10) gives, in even moderately dilute solutions of  $\alpha$ -eucaine hydrochloride, a white, silky and glistening precipitate.  $\beta$ -Eucaine and cocaine give no reaction.

Ammonia, even in dilute solution, precipitates the bases  $\alpha$ - or  $\beta$ -eucaine or cocaine, but  $\alpha$ -eucaine is almost insoluble in excess. In 1 per cent. solution the white precipitate is at once thrown down, and in the case of  $\beta$ -eucaine or cocaine dissolves immediately on addition of about its own volume of strong ammonia.  $\alpha$ -Eucaine, so precipitated, can be diluted at least ten times with strong ammonia without solution. In stronger solutions the difference still exists, but is not so easily recognized. A 3 per cent. solution of  $\beta$ -eucaine or cocaine requires about five times its own volume of ammonia to be redissolved and stronger solutions much in proportion to the per cent. present. In other words, a strong solution of ammonia will dissolve about one-half of one per cent. of the bases  $\beta$ -eucaine or cocaine, while it will dissolve

but a very small fraction of a per cent. of  $\alpha$ -eucaine. In dilute solutions this is a very characteristic reaction for  $\alpha$ -eucaine.

Potassium dichromate, in strong solution, added drop by drop to a 0.5 to 1 per cent. solution of  $\alpha$ -eucaine, begins to throw down a lemon-yellow precipitate after addition of 1 or 2 drops. The precipitate is then much increased by 1 or 2 drops of strong hydrochloric acid, and is quite insoluble, dissolving only after several times diluting the volume of the solution. With stronger solutions the precipitation takes place at once, the first drop giving a more and more permanent precipitate as the solution grows stronger. The precipitate is notably insoluble in either water or hydrochloric acid. More dilute solutions either show no precipitate or only after addition of hydrochloric acid. Cocaine, in 1 per cent. solution, is not precipitated by potassium dichromate, but the addition of 1 or 2 drops of concentrated hydrochloric acid throws down a yellow precipitate easily soluble in very slight excess of hydrochloric acid or on dilution of the solution with water. Weaker solutions do not precipitate while stronger solutions precipitate at once, but the precipitate is easily soluble.  $\beta$ -Eucaine acts like cocaine. The precipitate obtained with  $\alpha$ -eucaine is quite crystalline.

*Reactions distinguishing Cocaine from both  $\alpha$ - and  $\beta$ -Eucaine.* A small amount of cocaine hydrochloride rubbed down with dry mercurous chloride, and moistened with alcohol, rapidly becomes greyish black.  $\alpha$ -Eucaine hydrochloride becomes slowly a dark grey.  $\beta$ -Eucaine hydrochloride is not affected.  $\text{PtCl}_4$  solution slowly deposits a yellow crystalline precipitate with a 1 per cent. solution of cocaine hydrochloride. Similar solutions of  $\alpha$ - and  $\beta$ -eucaine are not precipitated by it, but stronger solutions are affected. The cocaine-platinum precipitate is insoluble in  $\text{HCl}$ , while the precipitates of  $\alpha$ - and  $\beta$ -eucaine are dissolved. With permanganate, cocaine hydrochloride gives the characteristic precipitate of crystalline cocaine permanganate; with either of the eucaines the colour of the reagent is at once discharged, and the precipitates obtained rapidly turn brown. Solutions of cocaine are strongly dextro-rotatory. Those of the eucaines are optically inactive. Cocaine applied to the eye causes mydriasis.  $\beta$ -Eucaine does not dilute the pupil.

*Characteristic reactions of  $\beta$ -eucaine hydrochloride.* The most characteristic property of this salt is its relative insolubility in water or in alcohol.

*Microscopic Characteristics.*—The hydrochlorides, when pure

are easily identified under the polarizing microscope and especially is cocaine hydrochloride recognizable at once. The slides are best prepared by allowing a drop of an aqueous solution to evaporate spontaneously. Cocaine, under these conditions, does not always crystallize at once even when quite dry. But if set aside for a few hours the crystals will form and the peculiar feathery and fan-shaped radiations, resembling very closely those seen on a broken nodule of wavellite, are recognizable even with the naked eye.

$\alpha$ -Eucaïne hydrochloride, in saturated solution, tends to crystallize in little spots which, under polarized light, look like very highly coloured rosettes made up of small crystals, so that the field is always bright, never showing any constancy of extinction directions. On edges of drop, the rosettes sometimes show small feathery forms of crystals of which the extinction directions vary, but are more often diagonal. A 5 per cent. solution gives much the same result. The rosettes frequently appear to be made up of concentric rings of very small crystals, the centre of rosettes being thicker than the edges and only the edges showing plate or feather forms large enough to be examined as individuals. Interference colours are very bright. When crystallized from dilute solution the rosette forms may become very small and numerous, covering the entire field, while the interference colours are only grey or black. The forms of grey and black overlying feathers are at times very prominent in  $\alpha$ -eucaïne and resemble nothing so closely as the small feathers of Plymouth Rock poultry.

$\beta$ -Eucaïne hydrochloride from saturated solution shows broad feathery or fern-like forms, sometimes blade-like or tabular. Usually the tabular forms show concentric rings of high colour around the edges and the extinction directions are easily determined. They are usually slightly oblique to the main axis of the crystal, but different crystals show two separate angles of extinction, one being the complement of the other, and due to the fact that the individuals are viewed from opposite sides. The forms already mentioned are more apt to be found around the outer edge of the evaporated drop while the centre is made up of isolated individuals which show brilliant tabular and prismatic forms sometimes quite small and rod-like. Rarely they are diamond-shaped. These diamond-shaped forms sometimes show extinction directions symmetrical to the main axis, but more often slightly oblique. The individual crystals are large and much more easily studied than those of  $\alpha$ -eucaïne. If more dilute solutions of less than 1.5 per cent. are used, the characteristics do not

come out so plainly, the crystal forms being smaller and showing very low interference colours, mainly light greys. Also these sometimes show feathery forms and rosette forms something like *α*-eucaine.

Cocaine hydrochloride in 10 per cent. to 1 per cent. solution crystallizes in fan-like shapes. A 2 per cent. solution gives a solid field of radiating forms, the individuals of which resemble very closely the forms sometimes seen on a frosted window. Extinction is parallel and perpendicular to the main axis of the crystals. Colours are brilliant and the whole field is characteristic, enabling one to distinguish cocaine immediately. With dilute solutions the fan-like shapes are still marked, but the field is sometimes broken and interference colours are a low order of light greys.

***α*-Ethyltricarballic Acid, A new synthesis of.** H. A. D. Jowett. (*Proc. Chem. Soc.* **18**, 199.) *α*-Ethyltricarballic acid has been synthesised by the following reactions:—

1. *Ethyl β-ethylcyanosuccinate* was prepared by condensing the sodium compound of ethyl cyanacetate with ethyl *α*-bromobutyrate.

2. The sodium compound of ethyl *β*-ethylcyanosuccinate was condensed with ethyl bromoacetate with formation of ethyl *α*-ethyl-*β*-cyanotricarballylate. This reaction may be represented by the equation,  $\text{CH}_2\text{BrCO}_2\text{Et} + \text{CO}_2\text{Et} \cdot \text{C}(\text{CN})\text{Na} \cdot \text{CH}(\text{C}_2\text{H}_5) \cdot \text{CO}_2\text{Et} =$   
 $\text{CO}_2\text{Et} \cdot \text{CH}_2 \cdot \text{C}(\text{CN})(\text{CO}_2\text{Et}) \cdot \text{CH}(\text{C}_2\text{H}_5) \cdot \text{CO}_2\text{Et} + \text{NaBr}.$

3. *Ethyl ethylcyanotricarballylate* was hydrolysed with sulphuric acid; the resulting acid, heated at 180°, gave *α*-ethyltricarballic acid.

*Ethyl β-ethylcyanosuccinate*,  $\text{CO}_2\text{Et} \cdot \text{C}(\text{CN})\text{H} \cdot \text{CH}(\text{C}_2\text{H}_5) \cdot (\text{CO}_2\text{Et})$ , boils at 167–168° under 20 mm. pressure, and has a density of 1.0647 at 15°/15°.

*Ethyl α-ethyl-β-cyanotricarballylate*,  $\text{CO}_2\text{Et} \cdot \text{C}(\text{C}_2\text{H}_5) \cdot \text{H} \cdot \text{C}(\text{CN})(\text{CO}_2\text{Et}) \cdot \text{CH}_2 \cdot \text{CO}_2\text{Et}$ , boils at 208° under 21 mm. pressure, and has a density of 1.0972 at 16°/16°.

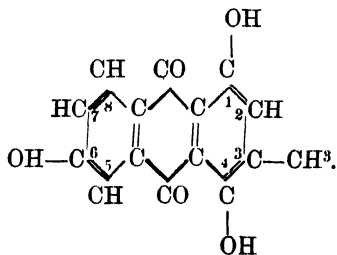
*α-Ethyltricarballic acid*,  $\text{CO}_2\text{H} \cdot \text{C}(\text{C}_2\text{H}_5) \cdot \text{H} \cdot \text{CH}(\text{CO}_2\text{H}) \cdot \text{CH}_2 \cdot \text{CO}_2\text{H}$ , melts at 157°C., the figure previously given by Michael (*Ber.*, 1900, **33**, 3745). The following new derivatives have been prepared:—The *anhydro-acid*,  $\text{C}_8\text{H}_{10}\text{O}_5$ , could only be obtained amorphous, and yields an amorphous compound with aniline; the *triethyl ester* is a colourless, limpid liquid boiling at 170–175°C. The *barium salt*,  $(\text{C}_8\text{H}_9\text{O}_6)_2\text{Ba}_3 \cdot 7\text{H}_2\text{O}$ , is crystalline, and is more soluble in cold than



in hot water. Only 6 molecules of water of crystallization are lost at  $180^{\circ}$ . The *calcium* salt,  $(C_8H_9O_6)_3Ca_3 \cdot 9H_2O$ , is characteristic, as its aqueous solution, on heating to  $100^{\circ}$ , becomes a firm jelly which liquefies on cooling. The *copper* salt,  $(C_8H_9O_6)_2Cu_3 \cdot 5H_2O$ , is a greenish-blue powder.

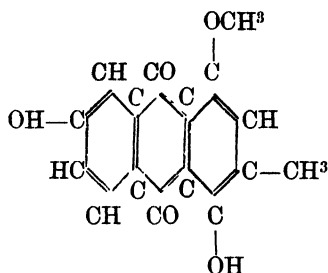
**Aloins, Action of Sodium Dioxide on, and their Halogen products.**

E. Léger. (*Comptes rend.*, **134**, 1111.) *Action of  $Na_2O_2$  on barbaloin and isobarbaloin.* If  $Na_2O_2$  be added to a solution of aloin on the water bath, strong reaction takes place, and the liquid assumes a deep red colour; the product, precipitated by HCl or dilute  $H_2SO_4$  is purified by successive crystallization from toluene and methyl alcohol. From the latter it is thrown down in the form of orange yellow, anhydrous needles melting at  $224-225^{\circ}C$ . which appear to be identical with the aloemodin of Tschirch and Oesterle. Both barbaloin and isobarbaloin give the same body. Its tetrachloride gives, when acetylated, a triacetic ester, indicating the presence of three hydroxyl molecules, so that the composition of this body, which is named methylisoxychrysasine, may be expressed by the formula



*Action of  $Na_2O_2$  on Chlorobarbaloin, chlorisobarbaloin and bromobarbaloin.* When the halogen products of these aloins are treated with  $Na_2O_2$  reaction takes place much more slowly. The oxidation product furnished by both aloins is identical, methylisoxychrysasine, tetrachloride  $C_{15}H_6Cl_4O_5$  or methylisoxychrysasine tetrabromide  $C_{15}H_6Br_4O_5$ ; the former crystallizing from methyl alcohol in fine orange-red needles melting at  $229-231^{\circ}C$ ., the latter in small cinnabar red needles m. p.  $264-266^{\circ}C$ .

*Action of  $Na_2O_2$  on nataloin and homonataloin.* These aloins, treated with  $Na_2O_2$  under the above conditions, give from methylalcohol long pale orange needles m. p.  $238^{\circ}C$ . which sublime. It has the formula  $C_{16}H_{12}O_5$ , and may be represented as



It has been named methyl-natalo-emodin, and is the methylic ester of a trioxymethyl-anthraquinone. Heated with HCl to about  $170^{\circ}\text{C}$ . it is converted into a compound natalomodine  $\text{C}_{15}\text{H}_{10}\text{O}_5$  (?), which crystallizes from methyl alcohol in deep orange-red needles, m. p.  $220.5^{\circ}\text{C}$ .

**Altingia excelsa**, Resin of. A. Tschirch and L. Van Italie. (*Archiv.* **239**, 541.) This resin, sometimes called Malay storax or Rassamala resin, occurs in two varieties known respectively as "Rassamala bodus"—white or yellow rassamala, and "Rassamala beureum"—red rassamala. The odour of both was aromatic, recalling a mixture of pepper, cinnamon, and turpentine. They were only partially soluble in alcohol, methyl alcohol, carbon disulphide, or glacial acetic acid, more soluble in ether, chloroform, or benzol, but slightly dissolved by soda solution or acetone. The alcoholic solution contained tannin. The ethereal solution deposited a few crystals of cinnamic acid, and the presence of a small amount of benzoic and cinnamic aldehyde was proved by treatment with bisulphite. It is evident, therefore, that rassamala resin has few constituents in common with storax; this may be due to its method of preparation; if treated like storax it is possible that the secretion of *Altingia excelsa* might be obtained in a similar condition.

**Alum, detection of, in Wines.** Lopresti. (*Zeits. für Unters. der Nahr. und Genussm.*, through *Annales de Chim. Analyt.*, **7**, 110.) Fifty c.c. of the wine is evaporated on the water bath to one-third of its volume, decolorized with animal charcoal, filtered, and the charcoal on the filter well washed. The filtrate is exactly neutralized with soda, using litmus as the indicator, and the volume adjusted to 50 c.c.; 3 c.c. of the neutral liquid is then agitated with 1 c.c. of alcohol, 90–95 per cent., and 5 to 6 drops of freshly-prepared tincture of logwood (1 : 20). In the absence of

When the liquid assumes an orange-yellow colour, but in its presence, a violet or blue tint is produced.

**Ammonia, Impurities in Commercial Solution of.** J. D. Pennoek and D. A. Morton. (*Journ. Amer. Chem. Soc.*, **24**, 377.) The chief impurities found to a greater or less degree in commercial strong solution of ammonia are carbon dioxide, tarry organic matter, pyridine, and seldom, if ever, hydrogen sulphide.

*Carbon dioxide* is thus determined volumetrically.

1. To 100 c.c. of the solution, contained preferably in a 300 c.c. conical flask, add 5 c.c. N/NaOH solution and boil until the volume is reduced to about 20 c.c.

2. To this residue add 50 c.c. of water (neutral, free from carbon dioxide and containing phenolphthalein), cool to 10°C., and bring to the neutral point by adding: first, N/H<sub>2</sub>SO<sub>4</sub> until the end point is nearly reached; next, N/10 H<sub>2</sub>SO<sub>4</sub> until the last trace of pink is just removed. *Excess of sulphuric acid must not be present at any time during this neutralization.*

3. To the solution thus neutralized add a measured quantity of N/10 H<sub>2</sub>SO<sub>4</sub> (usually 10 c.c.), boil two minutes to remove carbon dioxide, cool, and titrate back with N/10 NaOH (No. of c.c. N/10 H<sub>2</sub>SO<sub>4</sub>—c.c. N/10 NaOH)  $\times 0.044$  = gm. per litre CO<sub>2</sub> in the solution.

The carbon dioxide contained in 5 c.c. N/NaOH must be determined and allowed for in the analysis.

Concerning the respective steps of this analysis the following facts may be noted:

1. When solution of ammonia is boiled down in the presence of NaOH all CO<sub>2</sub> is retained as Na<sub>2</sub>CO<sub>3</sub>, even though the evaporation be carried nearly to dryness. The purpose of boiling down with NaOH is to remove all NH<sub>3</sub>, to reduce the bulk of the solution, and to retain all CO<sub>2</sub> as Na<sub>2</sub>CO<sub>3</sub>.

2. The addition of acid as described, will set free a little CO<sub>2</sub> which may partially volatilize from the solution, if the latter be too concentrated. By dilution with 50 c.c. of water, this cause of error is averted.

Before bringing to the neutral point the solution must be cooled to a low temperature (below 10°C.), otherwise the phenolphthalein colour end-point is not sufficiently distinct. Also there is less liability of loss of CO<sub>2</sub> by too rapid addition of acid, if the solution be well cooled.

The end-point is just reached when sufficient acid has been added to convert all the Na<sub>2</sub>CO<sub>3</sub> into NaHCO<sub>3</sub>, since the former is

alkaline, and the latter neutral, to phenolphthalein. Excess of  $\text{H}_2\text{SO}_4$  must not be present, or it will most certainly cause a loss of  $\text{CO}_2$  before excess of  $\text{NaOH}$  can be added. The final step is the decomposition of the  $\text{NaHCO}_3$  by an excess of  $\text{H}_2\text{SO}_4$  the removal of the  $\text{CO}_2$  by boiling, and the titration of the excess of  $\text{H}_2\text{SO}_4$  with  $\text{NaOH}$  0.1 c.c. of  $\text{N}/10 \text{ H}_2\text{SO}_4 = 0.0044 \text{ Gm. CO}_2$ .

*Determination of organic matter.* Make up fiftieth-normal solutions of ammonium-ferrous sulphate, potassium permanganate, and potassium bichromate.

Introduce 10 c.c. of the solution of ammonia (from pipette) into a 300 c.c. Erlenmeyer flask, add 20 c.c.  $\text{N}/50 \text{ K}_2\text{Cr}_2\text{O}_7$  solution (from burette), and 50 c.c. dilute  $\text{H}_2\text{SO}_4$  (1 : 3). Heat to boiling, and boil gently for about twenty minutes, adding distilled water if necessary to keep the volume above 50 c.c. After boiling, cool to temperature of the room and add  $\text{N}/50 \text{ Fe}(\text{NH}_4)_2(\text{SO}_4)_2$  solution (from burette) in excess, and titrate back to faint pink colour with  $\text{N}/50 \text{ KMnO}_4$  solution. The pink colour will always fade out in a short time.

Add number of cubic centimetres  $\text{KMnO}_4$  used to number of cubic centimetres  $\text{K}_2\text{Cr}_2\text{O}_7$  used, and subtract number of cubic centimetres  $\text{Fe}(\text{NH}_4)_2(\text{SO}_4)_2$  used. Deduct number of cubic centimetres  $\text{K}_2\text{Cr}_2\text{O}_7$  used up in a blank sample, and report result as number of cubic centimetres  $\text{N}/100 \text{ K}_2\text{Cr}_2\text{O}_7$  used per 100 c.c. of the sample.

The end-point of the method appears to be perfectly definite, no further oxidation occurring by boiling considerably longer than the prescribed twenty minutes. The results obtained have indicated that all organic colouring-matter, or compounds which may change over into coloured products are determined by this method, while pyridine, and perhaps other stable organic bodies, are unattacked.

*Determination of pyridine.* 100 c.c. of the solution of ammonia is nearly neutralized with  $\text{H}_2\text{SO}_4$  (1 : 5), keeping the mixture moderately cool meanwhile, so that pyridine will not be volatilized. Finally, cool to  $20^\circ\text{C}$ ., add 1 or 2 drops of methyl orange and bring exactly to the neutral point with normal acid and alkali.

This neutral mixture is then placed in a suitable distilling flask and distilled until 70 c.c. have passed over, the distillate being collected in 30 c.c. of cold water contained in a small receiver.

Unless the sample contains an unusually large amount of pyridine (*i.e.*, over 2.5 Gm. per litre), the 100 c.c. of liquid now in the

receiver will contain all the pyridine present, and a small amount of free ammonia. The amount of ammonia ( $\text{NH}_3$ ) which is thus carried over will usually be equivalent to about 2 c.c. normal solution.

Cool the contents of the receiver to below  $10^\circ\text{C}$ ., add phenolphthalein, then, from a burette, mercuric chloride solution until the last trace of pink is just removed, and, finally, four drops more  $\text{HgCl}_2$  solution, to ensure the complete removal of the  $\text{NH}_3$  according to the equation  $\text{HgCl}_2 + 2\text{NH}_3 = \text{NH}_2\text{HgCl} + \text{NH}_4\text{Cl}$ . Phenolphthalein is coloured by free ammonia, but not by pyridine, so that the pink colour is just removed when all the free  $\text{NH}_3$  is combined as "white precipitate." The mixture is then filtered, and the filtrate containing pyridine bases alone, is titrated with  $\text{N}/\text{H}_2\text{SO}_4$ , using methyl orange as an indicator; 1 c.c.  $\text{N}/\text{H}_2\text{SO}_4 = 0.079$  Gm. pyridine.

**Ammonio-cupric Sulphate, Crystalline.** H. Défournel. (*Répertoire*, 13, 468.) A hot, saturated aqueous solution of cupric sulphate is prepared, which is cooled to  $50^\circ\text{C}$ ., then further cooled in a stream of cold water, to produce the rapid formation of small crystals. The solution is then filtered, and treated with excess of ammonia, until it smells distinctly ammoniacal. It is then placed in a dialyzing apparatus, the outer vessel of which is charged with alcohol, 90 per cent., containing 5 per cent. of ammonia. The whole is covered with a sheet of greased glass to prevent the volatilization of the ammonia and alcohol. After four days, the ammoniated alcohol is syphoned off, and replaced by a fresh portion of the same solution, and again left for a period of four days. On repeating the process, a crop of fine crystals will be obtained on the under surface of the septum.

**Anise Oil (Illicium), Characters of.** E. O. Dowzard. (*Chem., and Drugg.*, 60, 961.) The official directions that the sp. gr. of this oil should be taken at  $20^\circ\text{C}$ . is unnecessary, since, in most anise oils, the melting point is  $2.5^\circ\text{C}$ . higher than the congealing point, and in a few  $2^\circ$  higher; consequently the oil, after melting, is invariably liquid at  $15^\circ\text{C}$ . In thirty samples examined the sp. gr ranged from 0.9810 to 0.9895 at  $15^\circ\text{C}$ . The rotation ranged from  $-1^\circ 20'$  to  $+0^\circ 40'$ . Although the oil is generally stated to be levorotatory, 30 per cent. of the specimens examined had a distinct dextro-rotation from  $+0^\circ 2'$  to  $+0^\circ 40'$ . Only the one showing the highest dextro-rotation being of doubtful purity.

**Antimonuretted Hydrogen, Pure.** A. Stock and W. Doht. (*Berichte*, 34, 2399.) By treating a powdered alloy of zinc and

antimony containing 25 per cent. of the latter metal, with a strong solution of tartaric acid and a dilute solution of hydrochloric acid, passing the gas evolved through water, then over  $P_2O_5$ , and condensing it by means of liquid air,  $H_3Sb$  solidifies, forming a white ring, while hydrogen is not affected. On volatilizing this solid substance the gaseous  $H_3Sb$  obtained has a peculiar musty odour, somewhat resembling that of  $H_2S$ , but quite different from that of  $H_3P$  or  $H_3As$ .

**Antimony, Detection and Determination of, in the Presence of Arsenic.** G. Denigès. (*Comptes rend.*, **133**, 688.) The substance containing antimony is dissolved in 25 per cent. HCl in such proportion that each c.c. of the solution shall contain not less than 1 Mgm. of that metal. This solution is placed in a platinum capsule, and a pointed sheet of pure tin is plunged into the liquid, so that the sharp end touches the bottom of the vessel. An almost immediate deposition of antimony on the platinum near the tin point takes place, in the form of a brown stain. The limit of the delicacy of the reaction is 0.002 Mgm. of Sb in 20 c.c. of the original solution after a contact with the Sn—Pt couple for 30 minutes. Arsenic is much less sensitive, giving no deposit, under similar conditions, if the dilution exceed 5 Mgm. in each c.c. with half-an-hour's contact. Quantitative results are obtained by comparing the results of different dilutions with those resulting from antimonial solutions of known strength. Another method depends on the property of antimony of forming a double iodide with cæsium, which has distinctive micro-chemical characters. The substance to be examined is dissolved in 25 per cent. HCl or in 10 per cent.  $H_2SO_4$ . A reagent is prepared by dissolving KI, 1; and CsCl, 3; in  $H_2O$ , 10. One drop of the acid solution is added to a drop of this reagent, when red or yellow hexagonal lamellæ of the double iodide of antimony and cæsium will be formed in the presence of the former metal. These crystals are readily identified by microscopic observation. In this way the presence of 0.0001 Mgm. of Sb may be detected. In the presence of arsenic, 0.001 Mgm. of Sb in 500 times its weight of arsenic may be shown, but the strength of the solution in arsenic should not exceed 5 Mgm. in 0.1 c.c., or crystals of the arsenic iodine salt may be obtained.

**Apiin and Apiose.** E. Vongerichten. (*Chem. Centr.* [2], **72**, 849, after *Liebig's Ann.*, **318**, 121.) The sugar residue in the molecule of apiin can only exist as a disaccharide, as shown by the equation representing its hydrolysis  $C_{37}H_{36}O_{15} \cdot H_2O + H_2O$

$=C_{15}H_{10}O_5 + 2C_6H_{12}O_6$ . By prolonged boiling with concentrated acids the entire sugar group is decomposed, but with very dilute acids the decomposition of the disaccharide is alone effected. The residue separates as a new glucoside, dextro-glucose apigenin, which separates from dilute alcohol as a yellowish white crystalline mass melting at  $215-220^{\circ}C$ ; it is insoluble in chloroform and in acetic ether, and reduces Fehling's solution only after prolonged boiling. The decomposition product of the disaccharide is a pentose, which does not give the same reactions as arabinose and xylose, nor furnish furfural on distillation with HCl. This has been named apiose. It is a light yellow syrup which does not crystallize even after prolonged exposure over  $H_2SO_4$ ; its osazone crystallizes from hot water in fine yellow needles, melting at  $155^{\circ}C$ . and the bromosazone, separating from alcohol in yellow needles, melts at  $211-212^{\circ}C$ . Since apiin is not diglucose-apigenin, but 3-apiose-dextro-glucose-apigenin, its formula must be altered from  $C_{27}H_{30}O_{15}$ , as generally accepted, to  $C_{26}H_{28}O_{14}$ . The other glucoside of the parsley, which accompanies apiin, is the disaccharide of a luteolinmethyl ester, and may be represented by the formula  $C_{27}H_{30}O_{15}$ .

**Argemone Mexicana, Constituents of.** J. O. Schlotterbeck. (*Journ. Amer. Chem. Soc.*, **24**, 238.) The author has definitely settled the moot point as to the presence of morphine among the bases of *Argemone mexicana*, finding alkaloid to be absent from the plant. The alkaloids found are berberine and protopine. The so-called "argemonine" of Peckolt is shown to be identical with the latter base. The presence of a notable quantity of potassium nitrate among the inorganic salts present in the plant is indicated.

**Aristol (Dithymol Di-iodide), Impurity of Commercial Specimens of.** H. Cousin. (*Journ. Pharm. Chim.* [6], **15**, 274.) Commercial dithymol di-iodide is found to be far from pure. In six samples examined, the author found that the percentage of inorganic salts left on dissolving out the aristol with ether, and incinerating the insoluble residue amounted to from 1.5 to 13.55 per cent. An even more serious impurity was, however, a chloro-compound which replaced a portion of the iodine. This was found to yield chlorine to the extent of 0.29 to 10.38 per cent.; the amount of iodine in the samples varied from 19.6 to 43.58 per cent., the theoretical quantity being 46.18 per cent. The worst sample examined contained but 41.65 per cent. of real dithymol di-iodide, the best 87 per cent. This contaminating chloro-compound is doubtless derived from the use of alkaline hypochlorite

in the process of manufacture. Thus, by one method, a solution of thymol in caustic alkali is mixed with potassium iodide solution, and the mixture poured into a large excess of strong alkaline hypochlorite. The iodine liberated combines with the thymol and the product is supposed to be wholly dithymol-di-iodide. Another method consists in mixing a solution of iodine in potassium iodide with an alkaline solution of thymol, and adding thereto a large excess of hypochlorite solution. The author finds that in both of these processes a part of the chlorine combines with the thymol, the product of the first containing 6.46 per cent. of chlorine thus combined, and that of the second 2.32 per cent. The only method by which dithymol di-iodide, free from chlorine, could be obtained was that official in the Codex, in which aristol is directed to be prepared by the action of a solution of iodine in KI on a solution of thymol in NaOH. It is further found that when such an alkaline solution of thymol is treated with sodium hypochlorite, without any iodine, an amorphous yellow precipitate is obtained which is probably a chloro-compound of thymol. The constitution of this body is being investigated.

**Arsenic, Detection of, by Means of Moulds.** (*Il Policlinico* through *Répertoire*, 14, 88.) It is well known that certain moulds, particularly *Penicillium brevicaulis*, when grown in arsenical solutions, evolve arsenuretted hydrogen, which may be recognized by its garlic-like odour. The method is sufficiently delicate to permit of the detection of minute traces of arsenic. By passing the gases evolved through a solution of mercuric chloride and hydrochloric acid, quantitative results may be obtained, by collecting and weighing the reduced metallic arsenic thus precipitated.

**Arsenic in Glycerin, Detection of** J. Bougault. (*Journ. Pharm. Chim.* [6], 15, 527.) A reagent is prepared by dissolving sodium hypophosphite 20 in water 20, and adding hydrochloric acid 200 fluid parts. A precipitate of NaCl is formed, which is separated by filtering through cotton. 5 c.c. of the glycerin to be examined is mixed with 10 c.c. of the reagent in a test tube and heated in the water bath. In the presence of 0.0001 Gm. of  $As_2O_3$  a brown coloration, rapidly forming a brownish flocculent precipitate, is formed. Even 0.00001 Gm.  $As_2O_3$  will give a distinct brownish colour.

**Arsenic, Removal of, from Hydrochloric Acid.** L. T. Thorne and H. E. Jeffers. (*Proc. Chem. Soc.*, 18, 118.) The following method is stated to be more efficacious and convenient than that



recommended by the Joint Committee of the Society of Chemical Industry and of Public Analysts.

The hydrochloric acid to be purified is diluted with water to a sp. gr. of about 1.10, then raised to the boiling point, and a piece of fine pure copper gauze of about 100 meshes to the inch introduced. When a couple of litres of liquid are being dealt with, the gauze should be about four inches square and coiled very loosely (about  $1\frac{1}{2}$  to 2 turns, round a long glass rod flattened at the end, as in this way it can be readily introduced and removed, besides being brought into better contact with the liquid. The whole is then kept just boiling for an hour. By this time the gauze will have become more or less blackened, and should be replaced by a second piece and the digestion continued for another hour. If this piece is also blackened, a third is used, and so on, until the gauze remains perfectly bright after about an hour's digestion. With moderately good acid, two, or at most, three pieces of gauze are sufficient. The gauze is then removed, and the acid at once transferred to a retort and distilled from a fresh piece of gauze. It is advisable, as a precaution, to reject the first 20 per cent. of the distillate, although even this is very rarely contaminated, if the digestion be carefully carried out; from 100 to 200 c.c. should be left behind in the retort. The method is simple and requires but little attention, and it is not necessary to use the purest acid; even good muriatic acid, "commercially free from arsenic," may be satisfactorily employed. The acid obtained is the constant boiling point acid, which is about the most suitable strength for use in the Marsh-Berzelius test.

The gauze must, of course, be gently ignited before being used, and should not be introduced until the acid is just beginning to boil. It is also preferable not to allow the digested liquid to cool in contact with the air before transferring it to the retort, as the copper gauze would be much attacked and its efficiency considerably lessened by the consequent oxidation.

**Artemisin.** Martin Freund and Ludwig Mai. (*Benichte*, **34**, 3717.) Artemisin is a lactone  $C_{15}H_{18}O_4$ , which, by action of alkali, forms a monobasic acid, artemisic acid  $C_{15}H_{20}O_6$ . The silver salt,  $C_{15}H_{19}O_6Ag, 2H_2O$  falls as a white precipitate when artemisin 10 Gm. is warmed for 10 minutes with  $Ba(OH)_2$  7 Gm. in  $H_2O$  100 c.c., the liquid freed from excess  $Ba(OH)_2$  by  $CO_2$  and the filtrate precipitated by silver nitrate. By heating the silver salt to  $100^\circ C$ . with methyl iodide, artemisic methyl ester is formed  $C_{14}H_{19}O_3COOCH_3$  m. p.  $180^\circ C$ . By distilling with zinc

dust in a current of hydrogen, artemisin gives 35 per cent. of a compound  $C_{12}H_{12}$  boiling at  $264^{\circ}C$ . This compound differs from the hydrocarbon obtained from santonin, but it is perhaps identical with  $\beta$ -dimethylnaphthalin.

**Artemisin.** P. Bertolo. (*Chem. Centr.* [2], **72**, 937.) In addition to santonin  $C_{15}H_{18}O_3$  Merck has shown that the capitula of *Artemisia maritima* contain another glucoside, artemisin,  $C_{15}H_{18}O_4$ , which is obtained from the mother liquors after separating santonin. It occurs in colourless crystals, melting at  $200^{\circ}C$ ., soluble in 3 parts of alcohol and in 60 parts of boiling water. The opt. rot. of a 10 per cent. solution in alcohol 92.2 per cent. is  $\alpha_D = -84.3^{\circ}$ . It forms an additive compound with chloroform  $C_{15}H_{18}O_4 \cdot CHCl_3$ , from which the chloroform is driven off at  $80^{\circ}C$ . It dissolves when heated with solution of soda to a carmine red solution, which becomes colourless on cooling. By treating the solution of the sodium salt thus obtained with dilute sulphuric acid, the artemisin is regenerated, but if concentrated sulphuric acid be employed for the purpose, a new crystalline body melting at  $170-171^{\circ}C$ . is obtained, the nature of which has not yet been determined. Artemisin acts as a monobasic acid, the silver salt having the formula  $C_{14}H_{19}O_3 \cdot COOAg$ . With hydroxylamine it forms the oxime  $C_{15}H_{18}O_3 \cdot NOH$  which crystallizes from methyl alcohol in white needles, melting at  $233-234^{\circ}C$ . With phenylhydrazine it gives a semi-solid phenylhydrazone. Like santonin, artemisin contains a lactone and a ketone group.

**Asarum Canadense, Essential Oil of.** F. B. Power and F. H. Lees. (*Proc. Chem. Soc.*, **17**, 210.) The investigation of the volatile oil of *Asarum canadense* has been resumed. (Refer *Year-Book*, **1881**, 180.) It is found to contain a phenol  $C_9H_{12}O_2$  having a creosote-like odour; pinene; dextro-linalool; lævo-borneol; lævo-terpineol; geraniol; methyl-eugenol; a blue oil boiling above  $260^{\circ}C$ . of an alcoholic nature; a lactone  $C_{14}H_{20}O_2$ , occurring only in small quantity, but being very fragrant; palmitic acid; acetic acid; and a mixture of fatty acids  $C_6H_{12}O_2$  to  $C_{12}H_{24}O_2$ . The acetic acid occurs as esters, while the higher fatty acids are in the free state. Methyl-iso-eugenol was not detected. The amount of methyl-eugenol present was 36.9 per cent.; the esters, calculated as  $C_{10}H_{17} \cdot C_2H_3O_2$ , amounted to 27.5 per cent.; the free alcohols in terms of  $C_{10}H_{18}O$  to 13.3 per cent. The amount of pinene obtained by direct fractionation was 2 per cent.

**Atomicity of New Gases.** H. Wilde. (*Comptes rend.*, **134**, 770.) The members of the newly-discovered atmospheric gases

are considered to belong, with nitrogen, to the series  $H \times 7n$ . Thus neon = 7; nitrogen 14; argon 21; krypton 42; xenon 63. These figures are based on the observed densities of Ramsay and Travers, which, except that of neon, accord fairly well with the theory. It is suggested that the high figure 9.96 observed for neon may be due to the presence, as impurity, of some other gas of greater density.

**Aucuba Japonica. A New Glucoside in.** E. Bourquelot and H. Hérissé. (*Comptes rend.*, **134**, 1441.) By means of emulsin (see p. 87) the presence of a glucoside in the seeds of *Aucuba japonica* has been revealed accompanied by large quantities of sucrose. To isolate this new glucoside the seeds were extracted by boiling alcohol, and the solvent distilled off in the presence of a little  $\text{CaCO}_3$ , the residue diluted with water and fermented with yeast to remove the sucrose. The fermented liquid was then boiled, treated with  $\text{CaCO}_3$ , filtered, decolorized with animal charcoal, evaporated to dryness in a partial vacuum, extracted with alcohol 95 per cent., and set aside, when crystals of the new glucoside were obtained. These, purified by recrystallization from water and alcohol, were quite colourless, melting at  $181^\circ\text{C}$ . were very soluble in water and had a slightly bitter taste. The optical rotation of its solution was  $\alpha_D = -173^\circ.1$ . It has been named aucubin. It contains no nitrogen and does not reduce Fehling's solution. By means of the same emulsin treatment the author has obtained indications of the presence of a glucoside in the rhizome of *Scrophularia nodosa*, and in the bark of *Betula*.

**Benzoic Acid and Benzoates in Foodstuffs, Detection of.** J. de Brevans. (*Annales de Chim. Analyt.* **7**, 43.) The filtered aqueous extract of a solid substance, or about 200 c.c. of a liquid is acidulated with  $\text{H}_2\text{SO}_4$  and shaken out three successive times with 50 c.c. of a mixture equal parts of ether and petroleum ether. The three ethereal extracts are bulked, and the solvent evaporated off at ordinary temperatures in a glass vessel. The residue may contain saccharin and salicylic or benzoic acids. Saccharin may be detected by its taste; salicylic acid by the ferric chloride reaction. Benzoic acid may sometimes be detected by the aromatic odour of the residue, and by the evolution of irritating vapours when heated; also by the arborescent form of the crystals when observed with a lens. Its presence may more accurately be established by the formation of aniline blue. A small particle of the residue is heated on a sand bath in a perfectly dry test-tube

with half a c.c. of aniline containing 0.02 Gm. of rosaniline hydrochloride in 100 c.c. After boiling for about twenty minutes, the tube being covered with a small bulb of water to condense the aniline vapours, the original red tint of the liquid will have changed to a more or less violet blue if benzoic acid be present. A few drops of HCl are then added to combine with the excess of aniline, and the mixture is treated with water; in the presence of benzoic acid an insoluble, deep blue substance is left, which is collected, washed free from violet colour with water, and then dissolved in alcohol, when the characteristic blue colour will be obtained with as small a quantity as 0.001 Gm. of benzoic acid in the original substance.

**Berberine, Occurrence and Detection of, in Plants.** H. M. Gordin. (*Archiv der Pharm.* **240**, 146.). Five to 20 Gm. of the substance is extracted with hot alcohol, and the solvent evaporated or distilled off. Twenty to 40 c.c. of water is then added and a little talc, and the mixture filtered. Two or 3 c.c. of the filtrate is mixed with a little 10 per cent. KI solution; if no precipitate be formed, berberine is not present in appreciable quantity. If a precipitate be formed, the presence of berberine is confirmed as follows:—Ten c.c. of the original filtrate is mixed with 1 or 2 c.c. of 10 per cent. NaOH solution and filtered. The filtrate is warmed to about 50°C. with 5 c.c. of acetone, and set aside. If much berberine be present, well-formed crystals of berberine acetone will be obtained in 15 to 20 minutes. Should no crystals appear in 2 hours, 30 c.c. of water is added, and the mixture left over night. If no crystals form by the morning the 10 c.c. of filtrate taken contains less than 0.01 Gm. of berberine. When KI gives a precipitate, but no crystals are obtained with acetone and NaOH, only a small quantity of berberine is present. Ten or 20 c.c. of the original filtrate is then mixed with excess of KI solution, and the precipitate collected and washed, first with water containing KI and finally with a little water only, and transferred to a very small flask, concentrated to about 2 c.c. when a few drops of NaOH solution and about 1 c.c. of acetone are added to it. After some hours the liquid is diluted with twice its bulk of water and left over night. If 0.001 Gm. of berberine be present, good crystals of acetone-berberine will be deposited by the morning.

Berberine has been detected in *Berberis vulgaris*, *B. aquifolia*, *Hydrastis canadensis*, *Xanthorrhiza aquifolia*, and *Coptis trifolia*. It is not found in *Cocculus palmatus*, *Pariera brava* (*Chondroden-*

*dron tomentosum*?) *Menispermum canadense* or *Jeffersonia diphylla*.

**Berberine of Gaze.** H. M. Gordin and C. G. Merrell. (*Archiv der Pharm.*, **239**, 626.) Gaze has stated that if the insoluble acetone berberine compound  $C_{20}H_{17}NO_4 \cdot C_3H_6O$ , obtained by the addition of acetone to a solution of a salt of berberine, be boiled with chloroform, the base is liberated in a pure state. The authors do not find this to be the case. The body thus obtained is found to be without any basic action, and to differ in every respect from the free alkaloid obtained by decomposing the pure sulphate with  $Ba_2HO$ . They find that Gaze's so-called berberine is the hydrochloride  $C_{20}H_{17}NO_4 \cdot HCl \cdot 2H_2O$ , resulting from the decomposition of the chloroform by the berberine in the acetone compound. This decomposition is found to be practically quantitative according to the equation  $4(C_{20}H_{17}NO_4)C_3H_6O + CHCl_3 + 4H_2O = 3(C_{20}H_{17}NO_4)HCl + 2H_2O + C_{20}H_{17}NO_4HCO_2H + C_3H_6O$ .

Piperidine is also found to decompose  $CHCl_3$ , about one-tenth of the base present being converted into hydrochloride.

**Berberine, Two New Methods for the Quantitative Determination of.** H. M. Gordin. (*Archiv der Pharm.*, **239**, 638.) When a solution of berberine acid sulphate is precipitated with an excess of potassium iodide, the equivalent of one molecule of a monobasic acid is set free for every molecule of berberine thus:  $C_{20}H_{17}NO_4 \cdot H_2SO_4 + KI = C_{20}H_{17}NO_4 \cdot HI + KHSO_4$ ; consequently by direct acidimetric titration the amount of berberine present may be readily determined. By the addition of  $H_2SO_4$  to alcoholic solutions of berberine salts, the acid sulphate is readily precipitated even in the presence of free  $HCl$ , and the precipitate is free from hydrochloride. Precipitation takes place more readily if an equal volume of ether be added. In aqueous solutions, however, the same reaction does not take place, since berberine hydrochloride is less soluble in water than the acid sulphate, so that if  $HCl$  be present in excess, the precipitate consists not of berberine acid sulphate, but of berberine hydrochloride. In the process of Lloyd-Thompson, therefore (*Amer. Journ. Pharm.*, **65**, 370), the precipitate obtained is not the hydrochloride but the acid sulphate; and in Linde's method (*Pharm. Centralt.*, **36**, 354), in which precipitation is effected from a solution in alcohol 38 per cent., the precipitate is not the acid sulphate, but is mainly hydrochloride. To determine the amount of berberine in crude drugs, the alcoholic extract is mixed with an equal volume of

ether, acidified with  $\text{H}_2\text{SO}_4$ , and the acid sulphate precipitated collected. This is treated with an excess of KI solution, and the free acid determined in an aliquot part of the liquid by means of N/40 NaOH solution. Another method is to precipitate the base as the insoluble hydroiodide and to convert this into berberine acetone, which is then washed and dried at  $105^\circ\text{C}$ . and weighed as such. Since berberine acetone is not absolutely insoluble in very dilute acetone, a correction must be made, and the volume of the liquids adjusted so that the ratio of acetone to water is 1:8. Each c.c. of liquid of this strength dissolves 0.000273 Gm. of alkaloidal berberine. The berberine is precipitated as hydroiodide, collected and washed with a 2 per cent. solution of KI. It is then washed down with a known volume of water into a flask, heated on the water-bath for 5 minutes, and then treated with half as much acetone as water added. Five c.c. of NaOH solution is added, well agitated for 10 minutes, then cooled and sufficient water added to bring the ratio of acetone to water to 1:8; the mixture is then allowed to stand for 12 hours, when the berberine-acetone deposited is collected, dried at  $105^\circ\text{C}$ ., and weighed. The volume of the filtrate having been noted, the necessary correction for solubility is then made.

**Bergamot Leaves, Essential Oil of.** S. Gulli. (*Chem. and Drugg.*, 60, 995.) This oil has been distilled for several years in the neighbourhood of Reggio, Calabria. The yield is limited; 100 kilos. of leaves give only 150 Gm. of oil.

The pure oil of this season has a sp. gr. of about 0.871 to 0.873; an optical rotation from  $+25^\circ 30'$  to  $+26^\circ$ , and an ester-content, calculated as linalyl acetate, of about 32 to 34 per cent. It is soluble in 90 per cent. alcohol (1:1). It contains methyl anthranilate.

The distillation of this oil is only carried on to a limited extent and takes place between February and April, at the time of pruning, the amount produced yearly in this district varying according to the demand. It may be calculated at about 20 to 25 kilos.

The oil is rarely pure; turpentine oil is often distilled with bergamot leaves, and, very often, before distillation, leaves and young saplings of bitter orange are added. Adulterations are extensively practised with the addition of peel essences.

The oil of bergamot leaves is put on the market as oil of petit-grain, or it is used to adulterate the oil of both bitter and sweet orange flowers. This adulteration, however, is easily detected,

because it alters both the sp. gr. and the optical rotation, and increases the linalyl acetate percentage of pure oils.

**Bergamot Oil, a New Adulterant of.** S. Gulli. (*Chem. and Drugg.*, 59, 383.) Turpentine which has been treated with a current of dry gaseous HCl so that it may contain from 30 to 40 per cent. of mono- or of dichlorhydrate of terebinthine, is stated to be used as an adulterant of bergamot oil. This chloro-derivative is decomposed during the process of saponification with alcoholic potash solution, and is, of course, reckoned as linalyl acetate should proper precautions not be taken. The turpentine so treated can be added to bergamot oil in the proportion of 5 to 10 per cent. without much altering the physical and chemical constants, whilst it hardly lowers the ester-content in the proportion of 1 to 2 per cent. This adulteration has been found in some samples of commercial bergamot oil in the proportion of as much as 10 per cent., as the following results show:—

| Oils. | Sp. Gr.<br>at + 15° C. | Opt. Rot. at + 20°<br>in 2 cm. tube. | Ester-content<br>per cent. |
|-------|------------------------|--------------------------------------|----------------------------|
| 1     | 0.882                  | + 10.50                              | 36.05                      |
| 2     | 0.8817                 | + 8°                                 | 36.75                      |
| 3     | 0.8810                 | + 6°                                 | 36.40                      |

It will be seen from these figures that the three samples of commercial bergamot oil have their sp. gr. and optical rotation nearly normal, and they contain an almost normal linalyl-acetate content. Nevertheless, they were adulterated, the first two containing almost 5 per cent. and the third at least 10 per cent. of turpentine oil treated with hydrochloric acid. It is therefore advisable to be on guard against this new adulteration, which can be ascertained neither by means of physical and chemical constants nor by saponification. Instead of saponification, fractional distillation may be employed, but the following is found to be the best plan. Several Gm. of the suspected bergamot oil is boiled with alcoholic potash solution in a platinum dish until the whole of the liquid is evaporated; the residue is then calcined so as to get rid of organic matter, and treated with distilled water and filtered. The usual test with nitrate of silver will show presence of hydrochloric acid.

**Bergaptin.** H. von Soden and W. Rojahn. (*Pharm. Zeit.*, 46, 778.) A crystalline body has been isolated from the distilla-

tion residues of bergamot oil, which is considered to be new and has been named "bergaptin." It appears to be closely allied to the bergaptene of Pomeranz. It crystallizes from petroleum ether in white tablets, and from ether in yellow cubes. It contains no phenolic nor methoxyl groups; it is saponified by alkali, and regenerated when the saponification product is treated with acid.

**Beryllium Basic Acetate.** G. Urbain and H. Lacombe. (*Comptes rend.*, **133**, 874.) On dissolving beryllium oxide in dilute acetic acid, and further diluting with water, an amorphous gummy mass is obtained which, when treated with glacial acetic acid, gives, on evaporation, the crystalline basic beryllium acetate  $(\text{CH}_3\text{CO}_2)_6\text{Be}_4\text{O}$ . This salt, which occurs in needle-shaped crystals, presents many interesting physical characters. It melts at  $283\text{--}284^\circ\text{C}$ ., boils at  $330\text{--}331^\circ\text{C}$ . and distills unaltered. It is therefore a true volatile salt of the metal. When dissolved in glacial acetic acid and treated with alcoholic KOH it throws down no precipitate; but if a trace of water be added to the mixture, an immediate precipitation of the whole of the beryllium (as hydrated oxide) occurs. This affords a remarkable instance of ionization. The basic salt is remarkably stable in acid solutions. Dissolved in acetic acid and saturated with gaseous HCl, it may be heated to  $150^\circ\text{C}$ . without giving evidence of the least decomposition.

**Bismuth Gallate.** P. Thibault. (*Journ. Pharm. Chim.* [6], **14**, 487.) Excess of gallic acid is allowed to stand, in the presence of water, in contact with pure hydrated bismuth oxide, prepared as directed by the author (*Year-Book*, **1901**, 42). After standing in the cold for 24 hours, with occasional agitation, combination is complete. The precipitate, collected, washed and dried, responds to the formula  $\text{BiC}_7\text{H}_7\text{O}_7$ . By leaving the ingredients together for 15 days the amorphous precipitate at first formed becomes crystalline, forming minute, transparent, yellow grains of the same composition as the above amorphous compound. This body combines with alkalis in definite proportions; in fact it appears to act as an acid. With potassium hydrate it forms the body  $\text{C}_7\text{H}_7\text{BiK}_2 + 11\text{H}_2\text{O}$  and a similar salt with sodium hydrate.

**Bismuth, Organic Compounds of, Employed in Medicine.** L. Prunier. (*Journ. Pharm. Chim.* [6], **14**, 492.) The compounds of bismuth employed in medicine fall into two classes, the true salts, such as the salicylate, neutral citrate, lactate and malate, and a second group formed of the bismuth organic acids, bodies which combine with alkalis, among which are bismuthogallic



acid (dermatol), bismutho-tartaric acid and its derivatives, and the products of analogous compositions such as airol, iodogallicine, etc. In the second group the bismuth performs a function analogous to that of antimony in the class of compounds known as "emetics," of which tartarated antimony is the type.

**Bismuth Salicylate, Crystalline.** P. Thibault. (*Journ. Pharm. Chim.* [6], **14**, 22.) By combining the pure hydrated oxide, obtained by the method previously described (*Year-Book*, **1901**, 42), with salicylic acid in alcoholic solution, complete combination is not obtained. If, however, instead of the hydrated oxide, anhydrous bismuth oxide be employed, a crystalline combination of the whole of the oxide with the salicylic acid results. Crystalline nitrate of bismuth 15, is precipitated from solution in nitric acid by excess of NaOH or KOH. By boiling, the hydrated oxide is converted into pure crystalline anhydrous oxide. This is washed by decantation and treated with salicylic acid 10, suspended in water 200. The mixture is left on the water-bath, when the reaction is slowly completed, as shown by the disappearance of opaque yellow crystals of bismuthic oxide, when the precipitate is examined *sub lente*. The supernatant liquid is then decanted while warm, the precipitate washed first with cold alcohol, then with ether, and dried at the ordinary temperature, or in the drying chamber. The bismuth salicylate thus obtained is in the form of definite, reddish-gray small, prismatic crystals, having the composition  $\text{Bi}_2\text{O}_3(\text{C}_7\text{H}_6\text{O}_3)_3$ . It is slowly decomposed by contact with cold water, more rapidly on warming. Cold alcohol is without action on the salt, but, on boiling, it removes the salicylic acid from combination. Ether is without action on it even at  $100^\circ\text{C}$ . It is decomposed by prolonged heating, liberating phenol. Acids set free the salicylic acid and alkalis combine with the acid, regenerating bismuth oxide.

**Blood, Differentiation of Human and Animal.** De Nobelle. (*Annales de la Soc. de M d. de Gand*, through *Annales de Chim. Analyt.*, **7**, 150.) The author confirms the results obtained by Wassermann and Schultze (*Year-Book*, **1901**, 42) with the serum of blood of animals previously injected with human blood serum. He further finds that human ascitic fluid and the liquid extracted by pressure from human placenta has the same effect when injected into animals, of rendering their blood-serum a precipitant of human blood serum, while it gives no precipitate with any other mammalian blood. Putrid human blood gives the reac-

tion, so also do bloodstains on linen, after being washed off with physiological salt solution. Human bloodstains on a rusty pair of scissors, which had been exposed for two months, gave the reaction when scraped off and macerated in solution of salt. To preserve the active animal serum, it is dried *in vacuo*, when it forms small scales which may be kept in the dark in small sealed tubes, and thus retains its activity for at least six months. Corin finds that the active precipitating body is a para-globulin, which is precipitated by magnesium sulphate. This may be collected, dried and re-dissolved when required for use.

**Boletol.** G. Bertrand. (*Comptes rend.*, 133, 1233, and 134, 124.) The blue colouring matter of various species of *Boletus* has been isolated in a pure condition in the form of fine red needles resembling alizarin in colour. It contains no nitrogen. In the crystalline state it is barely soluble in cold water, but in the amorphous condition is readily soluble; if, therefore, the crystals be dissolved by boiling in water, the solution thus formed does not again deposit crystals on cooling. It only exists in minute quantity in the fungi, not more than 5 to 10 Gm. being obtained from 100,000 Gm. of fresh material. The freshly-gathered and sliced fungi are covered at once with 5 times their weight of alcohol, 90 per cent., and boiled for 30 minutes to destroy the oxydases and dissolve the boletol. The mixture is strained and pressed while hot, and at once precipitated, while still hot, with neutral lead acetate solution, a few drops of basic acetate being added to complete the precipitation. The yellow precipitate is collected, washed, and suspended in a little water containing 10 per cent. of HCl. A portion of the boletol goes into solution with other organic bodies. After filtering on a pressure filter, the liquid is shaken out with several successive washings of ether, the ethereal extract filtered and allowed to evaporate spontaneously. The residue is taken up with water and again concentrated *in vacuo* to a syrup. Sometimes the boletol then crystallizes out; if not, a little HCl is added, when the syrup becomes transformed into a gritty mass in 24 hours. This is drained, the residue re-dissolved in water and evaporated in a desiccator. Impurities are left in the outer zones of the crop of crystals formed; the inner portion is separated and purified by recrystallization. A further quantity of boletol may be obtained by extracting the lead precipitate with ether, which removes fatty matter, carrying the boletol with it into solution. The ether is evaporated, the residue dissolved in warm water, the liquid filtered and

again shaken out with ether, after concentration. This portion is more easily purified than that obtained from the lead filtrate.

**Boric Acid and Borax, Titration of.** T. S. Barrie. (*Pharm. Journ.* [4], **14**, 315.) *Boric acid* The N/NaOH solution employed should be standardized against pure boric acid, since, if set in the usual way, against N/H<sub>2</sub>SO<sub>4</sub> solution, the results with HBO<sub>3</sub> will invariably be too high. The following method of titration is recommended for inclusion in the Pharmacopœia: One Gm. of the acid dissolved in 50 c.c. of warm distilled water should require, after the addition of 50 Gm. of glycerin and a few drops of phenol-phthalein solution, 16·25 c.c. volumetric solution of sodium hydroxide for neutralization.

*Borax.* The following method is recommended for inclusion in the Pharmacopœia: One Gm. of borax dissolved in 40 c.c. of distilled water should require for exact neutralization (indicator, methyl orange), 10·55 c.c. of N/2 H<sub>2</sub>SO<sub>4</sub>, and, after boiling and adding 50 Gm. of glycerin, should require 10·55 c.c. of N/NaOH to exactly neutralize (indicator, phenol-phthalein).

**Butter, Determination of Boric Acid in.** H. Droop Richmond and T. B. P. Harrison. (*Analyst*, **27**, 181.) Weigh out 25 Gm. of butter in a beaker, add 25 c.c. of a solution containing 6 Gm. of milk-sugar and 4 c.c. N/H<sub>2</sub>SO<sub>4</sub> to 100 c.c. Place in the water oven until the fat is just melted, and stir well; allow the aqueous portion to settle for a few minutes and draw off 20 c.c.; add a few drops of phenolphthalein, bring to the boil, and titrate with N/2 NaOH until a faint pink colour just appears; add 12 c.c. of glycerol, and titrate until a pink colour appears. The difference between the two titrations, less the amount of alkali required by 12 c.c. of glycerol, multiplied by 0·0368, will give the amount of boric acid in 20 c.c., and this, multiplied by

$$\frac{100 + \text{percentage of water}}{20}$$

will give the percentage. If the percentage of water is about the average, it may be taken as 13 without appreciable error.

Generally, the number of c.c. of N/2 NaOH used, multiplied by 0·2, will very closely approximate to the percentage of boric acid.

**Butter, Fluorides in.** O. and C. Hehner. (*Analyst*, **27**, 173.) Examination of samples of Brittany butter indicates that sodium fluoride is added as a preservative. A specimen of a preservative obtained from Brittany was found to contain 98 per cent. of sodium fluoride. The addition of this substance is considered to be very

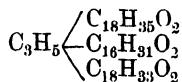
objectionable, since experiments show that the presence of fluoride prevents ptyalin and pepsin from performing their normal digestive action, and hinders the diastasic action of malt. No objection can be raised to the use of fluorides for the preservation of material for the manufacture of alcohol, but their employment as butter preservatives is strongly condemned.

**Butylic Alcohol, Normal, Synthesis of** Marcel Guerbet (*Comptes rend.*, **133**, 300). The author has previously shown that some alcohols, when heated to about 200°C with their sodium derivatives, undergo condensation with the elimination of caustic soda, as shown by the typical equation  $C'H'^{1}ONa + C'H'^{2}OH$

$C'H'^{1}OH + NaOH$ . This reaction holds good with iso amyl alcohol, giving rise to di amyl alcohol and isovaleric acid, with  $\alpha$  naphthyl alcohol, forming di $\alpha$  naphthyl alcohol and  $\alpha$  naphthyl acid, also with caprylic alcohol, resulting in the formation of di caprylic alcohol and caprylic acid. Ethyl alcohol seems to be an exception to this action, since, when it is heated with sodium ethylate, butylic (di-ethyl) alcohol is not formed, but simply ethylene and sodium hydrate. If, however, barium ethylate be employed instead of the sodium compound, and the heating be prolonged, a small quantity of butylic alcohol is obtained, as well as ethylene, hydrogen, acetate and carbonate of barium. The yield is small, not exceeding 6 per mille of the barium ethylate employed.

**Cacao Butter, Coconut Oil in** J. Wauters (*Chem. Centr.*, **72**, 1346) detects the adulteration of cacao butter or chocolate with coconut oil by means of a modification of the Reichert-Meißl method of determining the volatile fatty acids, which are present in coconut oil in much greater quantity than in cacao butter. He finds that 0.1 cc of N/10 alkali is sufficient to saturate the water soluble volatile acids of 5 Gm. of cacao butter, whereas the first distillation of the same quantity of coconut fat requires 7.1 cc, and a second distillation 4.3 cc, a total of 11.4 cc. The volatile acids of cacao butter insoluble in water only require 0.25 cc of N/10 alkali to saturate the product of the first distillation, and 0.16 cc for the second, a total of 0.41 cc. Coconut fat, on the other hand, yields insoluble fatty acids, using up 7.85 cc of N/10 alkali for the first distillation, and 7.55 cc for the second, a total of 15.4 cc. The author employs carbon tetrachloride as the extraction solvent for removing the fats for analysis.

**Cacao Butter, Constituents of.** J. Klimont. (*Monats. für Chem.*, **23**, 51.) By dissolving theobroma oil in three or four times its weight of acetone and cooling, crystals are obtained, which, when several times recrystallized from acetone, melt at 64°C., and consist of a mixture of stearin and palmatin. The portion more soluble in acetone, purified by several recrystallizations from the same solvent, finally melts at 31.3°C. It consists of a compound glyceride of oleic, palmitic and stearic acids,



Possibly other similar complex glycerides are also present, such as that of lauric, palmitic and oleic acids.

**Cactus Alkaloids.** A. Heffter. (*Berichte*, **34**, 3004, through *Chem. Centr.*, **72** [2], 1018.) The author has carried his researches on the alkaloids of *Anhalonium lewinii* a step further. He confirms the presence of the four bases originally isolated by himself, mezcaline, anhalonidine, anhalonine and lophophorine; also the anhalamine of Kauder (*Year-Book*, **1900**, 44), but considers the presence of pellotine as doubtful, since it has only been found in commercial "mezcal buttons," which invariably contain the flower buds of other species of Cacti. The author has already (*Year-Book*, **1895**, 49) found this base in quantity in the nearly allied *Anhalonium williamsi*.

**Anhalamine.**  $\text{C}_{11}\text{H}_{15}\text{O}_3\text{N}$  was isolated by taking advantage of its slight solubility in chloroform, as pointed out by Kauder (*loc. cit.*) It occurs to the extent of 0.12 per cent. It forms micro-needles melting at 185.5°C. The hydrochloride  $\text{C}_{11}\text{H}_{15}\text{O}_3\text{N HCl}$  crystallizes slowly with 2 mols.,  $\text{H}_2\text{O}$ ; from concentrated aqueous solution, with 1 mol.  $\text{H}_2\text{O}$ . The characters of its salts are given, and it is found to contain two methoxyl groups. The third atom of oxygen is combined in an hydroxyl group. Its formula may therefore be expressed as that of a secondary alkaloid,  $\text{C}_9\text{H}_7(\text{OCH}_3)_2\text{OH:NH}$ . It is optically inactive. Aqueous solutions of its salts give a blue colour with  $\text{Fe}_2\text{Cl}_6$ .

**Mezcaline.**  $\text{C}_{11}\text{H}_{17}\text{O}_3\text{N}$ . This base is not, as first supposed, a crystalline body, but an oily liquid, which in chloroform solution rapidly absorbs  $\text{CO}_2$ , forming a crystalline carbonate. It contains 3 methoxyl groups, and on oxidation with  $\text{KMnO}_4$  yields a crystalline monobasic acid,  $\text{C}_{10}\text{H}_{12}\text{O}_5$ , the salts of which are described. When treated with  $\text{HI}$  this acid yields gallic acid  $\text{C}_6\text{H}_2(\text{OH})_3\text{COOH}$ . In addition to the acid above described, mesca-

line gives, on oxidation with  $\text{KMnO}_4$ , another body melting at  $177^\circ\text{C}$ ., identified as trimethyl gallamide  $\text{C}_6\text{H}_2(\text{CH}_3\text{O})_3\cdot\text{CO}\cdot\text{NH}_2$ . The behaviour of mezcaline with methyl iodide and with benzoyl chloride, indicates that it is a secondary base, to which the formula  $(\text{CH}_3\text{O})_3\cdot{}^{3,4,5}\text{C}_6\text{H}_2(\text{CH}_2\cdot\text{NH}\cdot\text{CH}_3)_3$  is given.

*Anhalonidine.*  $\text{C}_{12}\text{H}_{15}\text{O}_3\text{N}$  also gives a blue colour with  $\text{Fe}_2\text{Cl}_6$ . It contains one hydroxyl and an inner nucleus, with two methoxyl groups. Its formula is therefore written  $(\text{CH}_3\text{O})_2\cdot\text{OH}\cdot\text{C}_{10}\text{H}_7>\text{NH}$ . It gives oxalic acid on oxidation.

**Cactus Alkaloids.** G. Heyl. (*Archiv.*, **239**, 454 and 460.) *Pilocereus sargentianus* is found to contain a new toxic amorphous alkaloid, pilocereine,  $\text{C}_{30}\text{H}_{41}\text{N}_2\text{O}_4$ , melting at  $85\text{--}86^\circ\text{C}$ . All its salts are amorphous. The base precipitates with all the usual alkaloidal reagents, with the exception of tannin. Heffter has examined the physiological action of the alkaloid, the toxic dose of which, for rabbits, is 0.1 Gm. for 1,000 Gm. body weight, the subject dying, apparently, from heart failure without any paralysis of the central nervous system. In frogs a dose of 8 to 10 Mgm. is fatal, a rapid general paralysis supervening. Its action on the heart of these animals is peculiar. Although the pulsations of the auricles are unaffected, the ventricles gradually lose their power of contracting, and ultimately remain in diastole.

*Cereus pecten aboriginum* also contains a new alkaloid, cereine. This also is toxic. It occurs as a yellowish syrupy liquid, with a peculiar narcotic odour. It gives a crystalline hydrochloride, and also a crystalline platinum double salt.

**Cæsium, New Salts of.** C. Chabrié. (*Comptes rend.*, **133**, 295.) *Cæsium sulphite*,  $\text{Cs}_2\text{SO}_3$ , is obtained by dissolving cæsium carbonate in boiling absolute alcohol and dividing the solution into two equal portions; through one of these  $\text{SO}_2$  is passed for some hours and the bisulphite formed partially precipitated. It is then mixed with the other half of the cæsium carbonate solution and heated under a reflux condenser for three hours. On then distilling off the alcohol and drying the residue on a porous plate *in vacuo*, a white crystalline mass of anhydrous cæsium sulphite is obtained. When prepared in the usual manner, with water, the sulphite obtained is invariably contaminated with appreciable quantities of sulphate. *Cæsium bisulphite*, obtained, as above, from alcoholic solution with excess of  $\text{SO}_2$ , gives well-formed white crystals which are anhydrous. *Cæsium thiosulphite*,  $\text{Cs}_2\text{S}_2\text{O}_3$ , is obtained in small needles, on boiling the sulphite with flowers of sulphur. *Cæsium dithionate*,  $\text{Cs}_2\text{S}_2\text{O}_6$ , is obtained in long,

transparent, hexagonal tablets by the interaction of solutions of barium dithionate and cæsium sulphate in molecular proportions.

**Caffeine Iodide.** A. Fauçon. (*Journ. Pharm. Chim.* [6], 15, 370.) Although caffeine iodide is frequently prescribed, the commercial preparations purporting to be of this composition are so varying and unstable that the author recommends that the article should be deleted from the materia medica, and the equivalent quantity of caffeine and an alkaline iodide employed in its place. He finds that commercial preparations invariably contain free iodine, one specimen examined giving 14.29 per cent., another 4.31 per cent. of the free metalloid, and all were very unstable. It is shown that caffeine iodohydrate, which is formed by the action of hydriodic acid on caffeine is easily dissociated by heat or solvents. The iodohydrate of di-iodo-caffeine, which is formed by the action of light on a dilute warm alcoholic solution of caffeine containing a little hydriodic acid, is also readily decomposed in moist air, forming tetraiodo-caffeine hydriodide  $C_8O_2N_4(CH_3)_3HI_4HI$ . This is the most stable of all the caffeine iodo-compounds. It is also formed by the action of a solution of I in KI on caffeine, in the presence of an acid. It crystallizes from acetic ether as deep-blue needles which melt at about 215°C. It is soluble in alcohol, ether and acetone, but water decomposes it, setting free iodine, and it is also dissociated on exposure to the atmosphere.

**Calamus Oil, Constituents of.** H. Thoms and R. Beckstroem. (*Berichte*, 34, 1,021; *Apoth. Zeit.*, 16, 688, through *Schimmel's Report*, Oct., 1901, and *April*, 1902.) The authors confirm the statement of H. von Soden and W. Rojahn (*Year-Book*, 1901, 46) that the crystalline principle of calamus oil with the high melting point is a sesquiterpene alcohol. On treatment with sodium it forms a monosodic alcoholate. Boiled with 50 per cent.  $H_2SO_4$ , the hydrocarbon  $C_{15}H_{22}$  distils. This boils under 15.5 mm. at 144°C. and has the sp. gr. at 23°C. 0.9324 and the rotation  $\alpha_D = -11.31^\circ$ . From the mother liquors of the crystals of the high-melting alcohol, another crystalline body melting at 61°C. was obtained, which was identified as asarone, which has hitherto only been found in the oil of *Asarum europæum*. By treating calamus oil with bisulphite, a mixed compound was obtained, from which, on liberating the combined aldehydic and ketonic bodies, crystals of asaryl aldehyde separated out on standing, the odour of the liquid being much diminished. On fractionating calamus oil under reduced pressure a portion boiling at 150–155° C. at 10 mm. was obtained, which furnished a white plastic mass when treated with

90 per cent. arsenic acid. From this compound petroleum ether removed an oil having the composition  $C_{15}H_{21}O$  boiling at  $180^{\circ}C$ . under 30 mm. pressure. On decomposing with water the residual white arsenical compound, a body melting between  $173-184^{\circ}$  was obtained. This is a polymer of asarone to which the name parasarone has been given.

**Calcium Glycero-arsenate.** V. Auger. (*Comptes rend.*, **134**, 238.) Pagel has stated (*Journ. Prakt. Chem.* [6], **13**, 449) that the glycerine ester of arsenic acid is a very stable body, in which the arsenic is intimately combined. The author, on the contrary, finds that it is far from stable; although glycerine and arsenic readily combine, the ester formed is immediately hydrolized on contact with water, in the same way as the other known esters of arsenic acid are hydrolized. It is concluded, therefore, that calcium glycero-arsenate cannot be prepared as recommended by Pagel, by treating the crude glycero-arsenic ester with water.

**Calcium Silicide.** H. Moissan and W. Dilthey. (*Comptes rend.*, **134**, 503.) By fusing pure lime with an excess of silicon, in a carbon tube in the electric furnace, a button of calcium silicide,  $CaSi_2$ , is obtained, surrounded by a layer of calcium carbide and whitish striae of calcium silicate.  $CaSi_2$  forms greyish, very brilliant crystals, having a density of about 2.5. It is not attacked even at a red heat by hydrogen, but ignites in fluorine, forming silicon fluoride and calcium fluoride. Chlorine is without action on it in the cold, but it becomes incandescent in that gas at a dull red heat; bromine and iodine react in a similar manner. It is only superficially attacked by heating in the air, nor is it markedly affected by oxygen,  $H_2S$ , or sulphur when heated to redness. It is very slowly attacked by moist air, and also by contact with water, evolving hydrogen, in which respect it differs markedly from calcium carbide. Hydrochloric acid decomposes it, evolving hydrogen, but no silicon hydride.

**Cannabis Indica, the Chemistry of.** John Humphrey. (*Pharm. Journ.*, **14**, 363.) The chemical history of *Cannabis indica* is concisely reviewed. The drug appears to contain no peculiar alkaloid, but may yield a certain proportion of choline (bilineurine) or some decomposition product of that base, such as trimethylamine, formed during the process of extraction. It also contains a little volatile oil, which consists chiefly of a sesquiterpene (cannabene) and paraffin, but the chief constituent of Indian hemp is apparently the resin (cannabin) of which "charas" mainly consists, and of which cannabinol is the active



principle. Finally, since cannabinal, on exposure to the air, becomes oxidized and loses its potency, the loss of activity of Indian hemp and its preparations would also appear to be due to that cause. Hence it seems desirable that Indian hemp used in medicine should be obtained as fresh as possible, and that, as suggested by Dr. Marshall, the drug and its preparations should be preserved in hermetically sealed packages if they are to be kept for any considerable length of time before use.

**Carbon Dioxide, Decomposition of at Low Pressures, by Electric Discharge.** J. N. Collie. (*Proc. Chem. Soc.*, 17, 168.) In the course of experiments on the relative resistance of  $\text{CO}_2$  in the vacuum tube to the electric spark from an induction coil, considerable variation of the resistance was noted; at the same time the colour of the incandescent gases at the negative electrode was seen to change. On analysis of the gases it was found that considerable decomposition had occurred into CO and oxygen,  $2\text{CO}_2 = 2\text{CO} + \text{O}_2$ . When  $\text{CO}_2$  at 5 mm. pressure is sparked in an ordinary vacuum tube for 10 minutes, 63 per cent. of the gas is decomposed, and even when exposed to the electric discharge for only 30 seconds as much as 58 to 60 per cent. is split up. When sparked at 10, 3 and 1 mm. pressure, 32, 55 and 65 per cent. of the gas respectively was decomposed. Aluminium electrodes were found to occasion rather more decomposition than the platinum electrodes generally employed. In an electrodeless tube only 50 per cent. of the contained gas was decomposed in 1 minute. It was observed that if the platinum electrodes were allowed to become red hot, recombination at once occurred, until the residual gas eventually became reconverted into almost pure  $\text{CO}_2$ . When a mixture of  $\text{CO}_2$  and hydrogen is sparked a small quantity of a gas which is probably methane is obtained, but no formaldehyde could be detected.

**Cassia Oil Testing.** (*Schimmel's Report, April, 1902*, 12.) The necessity of not relying solely on the aldehydic determination by means of the bisulphite absorption method is emphasized, and the importance of applying the distillation test for the presence of non-volatile impurities is insisted on. It is not impossible for an oil indicating 80 per cent. of cinnamic aldehyde to contain 10 per cent. of such foreign admixture. Now that the price of the oil is declining, the probability of attempts at sophistication arises.

**Cerium Oxalate, Medicinal, Composition of.** C. R. Boehm. (*Zeits. Angew. Chem.*, 1902.) Commercial medicinal cerium oxalate is found to be an excellent source of the various rare

earths, since it is obtained from the residues of monazite sand after extracting the thorium. On incineration, the specimen examined was found to consist of  $\text{Ce}_2\text{O}_3$  51.35;  $\text{La}_2\text{O}_3$  24.16;  $\text{Nd}_2\text{O}_3$  12;  $\text{Pr}_2\text{O}_3$  8.0 per cent. with traces of Sa, Yt, Yb, Er, Tb and Gd.

**Cereus Gummosus, Presence of Saponin in.** G. Heyl. (*Archiv.*, **239**, 464.) The dried cactus is found to be very rich in saponin, no less than 24 per cent. of that glucoside being found by Christophson's baryta method. The precipitate obtained with neutral lead acetate by Koberts' method was found to be the lead salt of a new saponin acid, cereinic acid, which is a glucoside resembling quillaic, polygalic, and ergotinic acids. It gives marked saponin colour reactions. After removal of this acid a further precipitate was obtained with basic lead acetate, which appears to be a sapotoxin lead-compound. No alkaloid was detected in the plant.

**Chelidonium Majus, Alkaloidal Constituents of.** E. Schmidt. (*Archiv.*, **239**, 395.) Summarizing the result of his own and others' researches on the basic constituents of *Chelidonium majus*, the author states that the alkaloidal bodies present in the plant are: Chelidonine,  $\text{C}_{20}\text{H}_{19}\text{NO}_5 \cdot \text{H}_2\text{O}$ ,  $\alpha$ -homochelidonine,  $\text{C}_{21}\text{H}_{21}\text{NO}_4$ ,  $\beta$ - and  $\gamma$ -homochelidonine,  $\text{C}_{21}\text{H}_{23}\text{NO}_4$ , chelerythrine,  $\text{C}_{20}\text{H}_{17}\text{NO}_4$ , sanguinarine,  $\text{C}_{19}\text{H}_{15}\text{NO}_4$ , and protopine,  $\text{C}_{20}\text{H}_{19}\text{NO}_5$ . M. Winter (ibid. 438) finds that chelidonine occurs in colourless monoclinic prisms melting at  $135^\circ$  to  $136^\circ\text{C}$ . It is one of the few alkaloids which cannot be titrated by the alkalimetric method with iodeosin, since the base is precipitated by alkali before the end reaction is apparent. The protopine, chelerythrine, and  $\beta$ -homochelidonine of *Chelidonium* are all identical with the same bases isolated from other Papaveraceous plants; the homochelidonine occurring in the same physical isomeric forms,  $\beta$ - and  $\gamma$ -homochelidonine, as in the case of *Eschscholtzia* and *Sanguinaria*,  $\beta$ -homochelidonine melting at  $159^\circ$  to  $190^\circ$  and  $\gamma$ -homochelidonine at  $169^\circ\text{C}$ . Both give gold salts of the same melting point  $187^\circ\text{C}$ .

**Chromic Acid and Soluble Chromates, Determination of.** Lyman F. Kebler. (*Amer. Journ. Pharm.*, **73**, 395.) Dissolve about 1 Gm. (accurately weighed) in enough distilled water to make exactly 100 c.c. Of this solution transfer 20 c.c. into a porcelain evaporating dish containing 75 c.c. of water, add 2 Gm. of potassium iodide, 15 c.c. of 10 per cent. sulphuric acid and mix well. Then add, from a burette, N/10 sodium thiosulphate until a distinct blue colour, without yellowish cast, results, or the end may be determined by means of a starch solution.

The reactions involved are represented by the following equations: (1)  $2\text{CrO}_3 + 6\text{KI} + 6\text{H}_2\text{SO}_4 = 3\text{I}_2 + \text{Cr}_2(\text{SO}_4)_3 + 3\text{K}_2\text{SO}_4 + 6\text{H}_2\text{O}$ ; (2)  $3\text{I}_2 + 6\text{Na}_2\text{S}_2\text{O}_3 = 3\text{Na}_2\text{S}_4\text{O}_6 + 6\text{NaI}$ ; (3)  $\text{K}_2\text{Cr}_2\text{O}_7 + 6\text{KI} + 7\text{H}_2\text{SO}_4 = 3\text{I}_2 + 4\text{K}_2\text{SO}_4 + \text{Cr}_2(\text{SO}_4)_3 + 7\text{H}_2\text{O}$ ; (4)  $3\text{I}_2 + 6\text{Na}_2\text{S}_2\text{O}_3 = 3\text{Na}_2\text{S}_4\text{O}_6 + 6\text{NaI}$ .

According to equations (1) and (2), one equivalent of  $\text{CrO}_3$  requires three equivalents of  $\text{Na}_2\text{S}_2\text{O}_3$ , or the decinormal factor of  $\text{CrO}_3$  is one-third of 0.009988 or 0.003329. In the same way the decinormal factor of potassium bichromate is one-sixth of 0.029378 or 0.004896.

Of five commercial samples of chromic acid examined, the lowest contained 38.8 per cent. of  $\text{CrO}_3$ , the highest 93.8 per cent. Two samples contained a large amount of sulphuric acid.

**Chromous Oxide.** J. Ferrée. (*Bull. Soc. Chim.* [3], **25**, 619.) This new oxide of chromium,  $\text{CrO}$ , is formed on exposing chromium-mercury amalgam to dry air. It is readily decomposed; when rubbed in a mortar it ignites, and is converted into chromic oxide. The same reaction takes place on heating. It gives a blue solution with  $\text{HCl}$ ; or, adding  $\text{HNO}_3$ , this becomes green. It is insoluble in  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$ .

**Cinchona Bark, Determination of Total Alkaloids in.** F. de Myttenaere. (*Chem. Zeit. Rep.*, **26**, 117.) 7 Gm. of finely-powdered bark sifted through a sieve of 30 meshes to 1 Cm. is placed in a 200 c.c. flask with chloroform 140 Gm., and solution of ammonia, 10 per cent., 10 c.c. is added. After macerating for 3 hours with occasional agitation, powdered tragacanth 3 Gm. and water 10 c.c. are added, and the mixture is well shaken until the solids aggregate together. After standing for an hour 100 Gm. of chloroform is quickly filtered off, the solvent distilled, and the residue dried on the water bath. It is then dissolved in the smallest possible quantity of  $\text{CHCl}_3$ , transferred to a separator containing 15 c.c. of  $\text{N}/10$   $\text{HCl}$  solution, the distillation flask being twice washed out with 5 c.c. of  $\text{CHCl}_3$ , and finally with sufficient ether, which, being added to the chloroform solution in the separator, causes the chloroform-ether mixture to float on the acid. It is then shaken out, the acid extract is filtered through a moist filter, the ether-chloroform twice washed with 10 c.c. of distilled water, passed through the same filter, which is finally washed free from acid. The amount of free acid in the filtrate is then titrated back with  $\text{N}/10$   $\text{NaOH}$ , using hæmatoxylin as the indicator. The number of c.c. of acid used up  $\times 0.0309$  gives the total alkaloid in 5 Gm. of bark.

**Cinchona, Liquid Extract of, Modified Process for Assay of.** F. H. Alcock. (*Pharm. Journ.* [4], 12, 90.) 5 c.c. (or, better, 5 Gm. are weighed, for it is not easy to measure accurately small quantities of thick, dark-coloured liquids such as the one now referred to) of the liquid extract are placed in a 4 oz. round white glass bottle fitted with a good cork, and to it are added 15 c.c. of benzolated amylic alcohol and 10 c.c. of N/KOH alcoholic solution; shake well, and put in a warm place for a few minutes, giving an occasional vigorous shake; pour off carefully the *clear* liquid into a separator, and again shake the contents of the bottle with 15 c.c. of benzolated amylic alcohol; pour off after a few minutes, and then add finally 10 c.c. of the benzolated amylic alcohol, and remove to the separator, avoiding the presence of any of the slimy and coloured magma which remains in the bottle.

The liquid in the separator is washed with two or more separate quantities of 5 c.c. of water, with or without the addition of 1 c.c. of 10 per cent liquor ammoniæ; warm, shake well, let subside, and remove.

This aqueous liquor often contains a trace of alkaloid, and all the glycerin of the extract, and could be reserved for the determination of the amount of the glycerin contained in the extract by some suitable process.

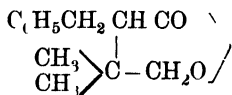
Having cleared the solvent liquid of colouring matter, alkali, and glycerin (the last named would find its way into the final chloroform soluble residue in the subsequent operation, and give high and erroneous results if not removed at this stage) the alkaloid is extracted by acidulated water in the usual manner, giving three washings at least. Separate this aqueous liquid, and finish according to the official process, giving four washings with the chloroform, by using 15 c.c. first, recovering this by distillation after separation and removal, and again using the distillate, and so on, until all alkaloid has been extracted from the ammoniacal alkaloidal solution, as indicated by Mayer's or other suitable reagent, after making the liquid slightly acid.

**Cinchonine, New Salts of.** G. Tarrozi. (*Pharm. Zeit.*, 46, 693.) By the interaction of cinchonine sulphate with barium sulphocarbolate, cinchonine sulphocarbolate which crystallizes in reddish-white needles is obtained. In a similar manner cinchonine sulphocresotate may be obtained as an amorphous salt. Another new salt is the acid hydrochloride, which occurs in prismatic needles. All these salts are stated to be markedly antiseptic, and to possess

greater antithermic action than the free base, they are all useful prophylactics against malaria

**Cinnamic and Isobutyric Aldehydes, Condensation of.** K Mœchel and K Spitzauer (*Monats fur Chem*, **22**, 1119) By shaking equimolecular quantities of cinnamic aldehyde and isobutyric aldehyde with an equal volume of saturated solution of potassium carbonate, after some weeks an aldol  $C_{11}H_{16}O_2$  was obtained. It is a viscous oil of fruity odour, insoluble in water, easily soluble in alcohol and ether, it adds on bromine and has the constitutional formula  $C_6H_5CH=CH-CH(OH)-(CH_3)_2-CHO$ . If 1 molecule KOH (in 10 per cent alcoholic solution) be added very gradually (the addition lasting about one day) to a cooled mixture of 1 molecule of cinnamic with 2 molecules of isobutyric acid, the resulting product shows that the aldehydes have combined in equimolecular proportions while the extra molecule of isobutyric aldehyde has been transformed into octoglycal and isobutyric acid.

When alcoholic potash acts on a mixture of both aldehydes in the molecular proportion of 1 : 2 : 2, and the reaction product is distilled with steam, the aldol  $C_{11}H_{16}O_2$  distils over, whilst on acidifying the alkaline residue a crystalline body is precipitated. This body is the lactone of a  $\gamma$ -oxyacid, it melts at  $89-90^\circ C$  and boils at  $343-345^\circ C$ . The yield from 14 Gm isobutyric and 26 Gm cinnamic aldehyde amounted to 15 Gm aldol and 24 Gm lactone. If more KOH is used more lactone and less aldol is obtained, and since the composition of the lactone is the same as that of the aldol, it must be formed from it by molecular transformation, and therefore has the following constitution —



**Cinnamon Oil, Characters of.** E Dowzard (*Chem and Drugg.*, **60**, 961), Of eight samples of genuine cinnamon oil examined the sp gr was found to range from 1.0321 to 1.0386. The latter sample contained 84 per cent. of cinnamic aldehyde and 3 per cent of eugenol. In the others amount of aldehyde ranged from 68 to 80 per cent and the eugenol from 3 to 10 per cent. Eight per cent is usually considered to be the maximum limit for a genuine cinnamon bark oil, but since the sample with 10 per cent contained 77 per cent. of aldehyde and had the sp gr 1.0337, it was not considered to be adulterated. Cinnamon

bark oil is not found to be optically inactive, the observed rotation in the specimens under notice ranging from  $-0^{\circ}14'$  to  $+2^{\circ}30'$ .

**Cinnamon Oil, Constituents of.** (*Schimmel's Report, April, 1902*, 14.) An extended examination of cinnamon oil, distilled\* at Miltitz, shows the presence of the following bodies, in addition to cinnamic aldehyde, phellandrene and eugenol, which were previously known to be present:—Methyl-n-amyl ketone,  $\text{CH}_3\cdot\text{CO}\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{CH}_3$ . It has also been found in the first runnings of clove oil. Pinene,  $\text{C}_{10}\text{H}_{16}$ ; cymene,  $\text{C}_{10}\text{H}_{14}$ ; furfural,  $\text{C}_4\text{H}_3\text{O}\cdot\text{CHO}$ ; benzaldehyde,  $\text{C}_6\text{H}_5\cdot\text{CHO}$ ; nonylaldehyde,  $\text{C}_9\text{H}_{18}\text{O}$ ; cumicaldehyde,  $\text{C}_{10}\text{H}_{18}\text{O}$ ; linalol,  $\text{C}_{10}\text{H}_{18}\text{O}$ ; caryophyllene,  $\text{C}_{15}\text{H}_{24}$ , and probably, also, hydrocinnamic aldehyde,  $\text{C}_6\text{H}_5\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{CHO}$  and linalyl isobutyrate,  $\text{C}_{10}\text{H}_{17}\cdot\text{OCOC}_3\text{H}_7$ .

**Citron Oil.** H. E. Burgess. (*Analyst, 26*, 260.) A specimen of pure citron oil was found to have the following characters:—Sp. gr. at  $15^{\circ}\text{C}$ ., 0.8513; refractive index  $[\text{N}]_{\text{D}} 20^{\circ}\text{C}$ ., 1.4750; optical rotation  $[\alpha]_{\text{D}} +80^{\circ}13'$ . On fractionating under reduced pressure the first 12 per cent. had the rotation  $+86^{\circ}30'$ , the next 80 per cent.  $+85^{\circ}30'$ , the final 5 per cent.  $+13^{\circ}30'$ . On refractionation, the main fraction was identified as limonene, with a possible trace of dipentene. The original oil gave 6.2 and 5.8 per cent. of citral by the bisulphite absorption test and 5.7 per cent. by the hydroxylamine method. The deposit from the oil, dissolved in chloroform, gave crystals, which, when purified by recrystallization from alcohol, melted at  $145^{\circ}\text{C}$ . Analysis pointed to the formula  $\text{C}_{18}\text{H}_{18}\text{O}_6$ . The physical constants of this specimen are widely different from those generally given for the oil, which is, according to the author, only expressed in Sicily to special order. Considerable confusion has arisen, too, since in France and Sicily, lemon oil is known as "Essence de Citron," whereas true citron oil is called "Essence de Cedrat." The greater part of the "citron" oil sent to this country is nothing more than a mixture of lemon and verbena oils, with sometimes a trace of rose otto as a sweetening agent.

S. Gulli (*Chem. and Drugg.*, 60, 19) gives the sp. gr. 0.8705 and the  $a_{\text{D}} = +67$  for a pure oil obtained by himself from the rind of *Citrus medica* var. *vulgaris* Risso. Commercial citron oil containing much lemon oil was found to have the sp. gr. 0.858 and the  $a_{\text{D}} = +62^{\circ}10'$ .

**Citronella Oil, Javan, Presence of Dextro-Citronellol in.** (*Schimmel's Report, April, 1902*, 20.) Although the presence of citronellol in Ceylon citronella oil has not been confirmed,

notwithstanding that it has been stated to exist to the extent of 6 per cent. by Flatau and Labbé (*Year-Book*, 1899, 75), its occurrence in Javan citronella oil has been established, and proved to be identical, except in optical rotation, with the lævo citronellol of geranium oil by the melting point of the silver phthalic ester, 125.5—126.5°C. It was obtained from the geraniol containing fraction of Javan citronella oil, by treating the  $\text{CaCl}_2$  compound with petroleum ether, distilling off the solvent, fractionating, and treating the fractionated oil with phthalic anhydride for 12 hours on the water bath. The acid phthalic ester thus formed was dissolved in an equivalent proportion of soda solution; the decomposed geraniol being removed by shaking out with ether, the aqueous solution of the ester salt was then saponified with KOH, when dextro-citronellol was liberated. This is the first time that it has been recorded as the constituent of a natural product.

**Clove Oil, Characters of.** E. Dowzard. (*Chem. and Drugg.*, 60, 961.) The limit for the sp. gr. of clove oil in the British Pharmacopœia is "not below 1.050." Parry gives the figures 1.048 to 1.065. Schimmel fix the sp. gr. between 1.045 and 1.070. Eleven specimens examined by the author had the sp. gr. between 1.0474 and 1.0574. The eugenol contents of these, by the potassium hydrate absorption method, lay between 84 and 89 per cent.

**Clove Oil, Constituents of.** (*Schimmel's Report*, April, 1902, 24.) In addition to eugenol and furfural, the presence of methyl normal amyl ketone, previously indicated, is now confirmed. The lower fractions of clove oil distillation which boil at 159°C. and under, give a characteristic aldehyde-ketone solid compound when treated with sodium bisulphite. On decomposing this an irritating odour is evolved, probably due to valeraldehyde. The ketone, freed from furfural by oxidation with 1 to 2 per cent.  $\text{KMnO}_4$  solution, distilled at 151—153° C.; it had the sp. gr. 0.8223 and was optically inactive. Its identity was established by the melting point of its semicarbazone, which fused at 122—123° C. The fractions of clove oil distilling at 200—240° C. gave a considerable quantity of benzoic acid when saponified. Since methyl alcohol has already been recorded as a constituent of clove oil, methyl benzoate is probably present.

**Clove Oil, Determination of Eugenol in.** A. Verley and F. Boelsing. (*Berichte*, 34, 3359.) Applying their pyridine-acetic-anhydride method (see p. 77) to the determination of eugenol in clove oil, the authors state that it gives results that are satisfactory so long as no other phenols or alcohols are

assumed to be present; that J. C. Umney's absorption method (*Year-Book*, 1895, 167) may give too high results unless the oil be normal in character; that, as is well known, the 10 per cent. aqueous solution of alkali also dissolves a portion of the non-phenolic constituents of the oil. More accurate results are obtained by employing a more dilute, 3 to 4 per cent., solution of NaOH. Thoms's benzoyl-eugenol process (*Year-Book*, 1892 179) gives results which are generally too low. The authors' figures as seen below do not appear to entirely support these conclusions. Three samples were prepared with pure eugenol and sesquiterpenes. By the three processes the following figures were obtained :—

|                                       | Per cent. | Per cent. | Per cent. |
|---------------------------------------|-----------|-----------|-----------|
| Actual eugenol value . . . . .        | 85.0      | 90.0      | 95.0      |
| Acetic pyridine method . . . . .      | 84.4      | 89.5      | 95.9      |
| Absorption process (dilute) . . . . . | 85.3      | 90.0      | 95.0      |
| Benzoyl eugenol process . . . . .     | 81.5      | 87.2      | 91.4      |

**Cobalt Silicide, a New.** P. Lebeau. (*Bull. Soc. Chim.*, 25, 538.) The new combination of cobalt and silicon  $\text{CoSi}$ , which is therefore distinct from the silicide previously obtained by Vigouroux, having the formula  $\text{Co}_2\text{Si}$ , was obtained by fusing the constituents together in the electric furnace. The fused button thus obtained was treated alternately with nitric acid and caustic soda solution, when bright prismatic crystals of  $\text{CoSi}$  were left insoluble. It is slowly dissolved in nitro-hydrochloric acid, but rapidly in  $\text{HCl}$ . It melts in a current of hydrogen at  $444^\circ \text{C}$ ., is slightly oxidized by water vapour at  $1200^\circ \text{C}$ . and, when heated to a high temperature in an atmosphere of ammonia, fixes nitrogen.

**Cocaine, Toxicological Detection of.** Hans Proelss. (*Apoth. Zeit.*, 16, 779.) In the living body cocaine is so rapidly converted into ecgonine that its detection is almost impossible; in the dead body it cannot be identified after fourteen days. No very characteristic reactions are available for both alkaloids. Both are colourless when treated with  $\text{H}_2\text{SO}_4$ ; the addition of a crystal of  $\text{K}_2\text{Cr}_2\text{O}_7$  causes no change at first, then a red brown colour, and, when heated, a permanent green; ecgonine gives this green tint in the cold. Other alkaloids are either coloured with  $\text{H}_2\text{SO}_4$  or do not retain, on heating, the green colour, developed after the addition of  $\text{K}_2\text{Cr}_2\text{O}_7$ . Ecgonine gives with  $\text{H}_2\text{SO}_4$  and  $\text{HIO}_3$  a cherry-red colour on prolonged heating, turning brown and leaving a brownish-yellow residue on evaporation. Cocaine, under like conditions, is colourless. Ecgonine and chlorine water, when



evaporated together, give a green colour with  $\text{H}_2\text{SO}_4$ ; the same alkaloid with  $\text{HNO}_3$  and  $\text{HIO}_3$  remains colourless in the cold, but turns red, then brown, on heating; cocaine remains colourless in each case. Cocaine, evaporated to dryness with  $\text{HCl}$  and then treated with  $\text{Co}_2\text{NO}_3$  solution, develops a fine light-blue colour; with ecgonine this colour does not always appear, and if it does, is very fugitive. Of recently-published reactions for cocaine the author has only found the reduction of calomel to be of practical value. He cannot confirm the statement of Schell—that pilocarpine also causes this reduction. Nor can he obtain the violet reaction described by Kuborne as characteristic of cocaine when that base is evaporated with  $\text{HNO}_3$  and treated with alcoholic  $\text{KHO}$ ; nor the reaction of Lenz, in which cocaine is stated to give a greenish-yellow, then bluish rose tint when fused with  $\text{KHO}$ . Ecgonine cannot be shaken out with any known immiscible solvent from either acid or alkaline solutions, nor is its isolation by means of precipitants satisfactory in toxicological work, so that the presence of cocaine cannot be satisfactorily determined after it has been converted into ecgonine.

**Colophony, American, Constituents of.** W. Fahrion. (*Chem. Centr.*, **73**, 120, after *Zeitsch. für angew. Chem.*) The chief constituent of American rosin is sylvinic acid,  $\text{C}_{30}\text{H}_{30}\text{O}_2$ . The acid exists in colophony as an amorphous modification. By treatment with aqueous alcohol, or by passing gaseous  $\text{HCl}$  into the alcoholic solution, it is changed into the crystalline modification which possesses a considerably higher melting-point. By long heating, the crystalline body is again transformed into the amorphous state. Sylvinic acid has two double linkages and consequently the free acid, and especially its salts, undergo oxidation in the air. Thus there are formed the superoxides  $\text{C}_{20}\text{H}_{30}\text{O}_4$  and  $\text{C}_{20}\text{H}_{30}\text{O}_6$ , which are insoluble in petroleum ether. Both however easily undergo a molecular transformation, forming oxy-sylvinic acids  $\text{C}_{20}\text{H}_{28}(\text{OH})\text{O}_3$  and  $\text{C}_{20}\text{H}_{28}(\text{OH})_2\text{O}_4$  soluble in petroleum ether. Both kinds of oxidation-products occur in colophony in varying proportions, and account for the different composition of the various commercial rosins. The petroleum ether soluble oxy-sylvinic acids are not the end products of auto-oxidation.

Dioxy-sylvinic acid takes up another oxygen molecule and forms a superoxide, insoluble in petroleum ether, whilst tetra-oxy-sylvinic acid, in course of oxidation and splitting off of water, forms a compound, insoluble in petroleum ether, the nature of which is not known.

As secondary oxidation processes begin, neutral unsaponifiable substances are at first produced, soluble in petroleum ether, which, by warming, give rise partially to volatile bodies. Finally there is produced a small quantity of a petroleum ether soluble saponifiable body which is probably an acid anhydride.

When sylvinic acid is oxidized with potassium permanganate there is produced, besides a considerable quantity of auto-oxidation products, what is probably a tetrahydroxysylvinic acid  $C_{20}H_{30}(OH)_4O_2$ . The author finds the formula  $C_{20}H_{30}O_2$  attributed by Mach to abietinic acid to be incorrect.

**Collinsonia Canadensis, Occurrence of a supposed Alkaloid in.** H. J. Lohmann. (*Nat. Drugg.*, **31**, 220.) The drug was extracted with a mixture of three volumes of alcohol, two volumes of water and five c.c. dilute sulphuric acid, added to every 120 c.c. of this liquid. 30 Gm. of No. 60 powder of the root was extracted, the extract evaporated and precipitated with N/KOH solution, in sufficient quantity to render the liquid slightly alkaline; the resinous matter that is precipitated upon evaporation of the liquid was re-dissolved in the alkaline solution, and the crystals of the alkaloid were precipitated from the solution after from one half to one hour. These 30 Gm. yielded 0.52 Gm. of the crystals, which proved very slightly soluble in ether and chloroform, freely soluble in alcohol and insoluble in water.

Treating this "alkaloid" with dilute sulphuric acid, dilute hydrochloric acid, and dilute nitric acid respectively, the crystals combined freely with them and recrystallized in the same form. On treating the solution of the salt as produced with the acids by the usual methods for the determination of glucose, the tests proved negative for glucosides.

The sublimation test between two watch glasses proved the stability of the alkaloid which fused at  $62.5^\circ C$ . It is a powerful diuretic, 1/10 grain causing a marked increase in the urinary secretion.

H. M. Gordin (*Drugg. Circ.*, **46**, 29), on the other hand, has re-investigated the root, and finds that the so-called alkaloid recorded by Lohmann is nothing but magnesium phosphate. No trace of alkaloid was found.

**Conium Alkaloids.** F. B. Ahrens. (*Berichte*, **35**, 1330.) The mixture of bases examined was a by product from the manufacture of conine, and had a rotation of  $\alpha_D = -28^\circ$ . To separate 1-methyl-lævo-conine the bases were converted into hydrochlorides, treated with sodium nitrite, the nitroso-compound

removed by extraction with ether, and the secondary and tertiary bases regenerated. The tertiary base, 1-methyl-lævo-conine, was at once obtained pure. It is a colourless liquid with an odour like coniine; it boils at  $175.6^{\circ}\text{C}$ . and has the  $\alpha_D = -81.92^{\circ}$ . It gives crystalline salts. The base, liberated from the nitroso-compound, was found to be a mixture of dextro- and iso-conine, from which, by recrystallizing from excess of tartaric acid, a lævo-conine  $\alpha_D = -15^{\circ}\text{C}$ . was obtained. This, when regenerated, distils at  $166.5^{\circ}\text{C}$ . It forms crystalline salts.

**Convallaria Leaf Oil.** Hænsel (*Pharm. Zeit.*, **46**, 582) reports that the leaves of *Convallaria majalis* yield, when steam distilled, 0.058 per cent. of a semi-solid, greenish-brown, volatile oil, having a pleasant aromatic odour. It melts at  $40.5^{\circ}\text{C}$ ., and commences to boil at  $120^{\circ}\text{C}$ . By pressing and solution in alcohol shining white crystals are obtained, which melt at  $61^{\circ}\text{C}$ . and have the empirical formula  $\text{C}_{20}\text{H}_{40}\text{O}_5$ .

**Copaiba Resins.** E. Keto. (*Archiv der Pharm.*, **239**, 548.) The resinous constituents of the various commercial copaibas have been investigated by the method of Tschirch, by successive shaking out the ethereal solution of the resins with aqueous ammonium carbonate, sodium carbonate and sodium hydrate solutions.

**Maracaibo Balsam.** The resin acid of Maracaibo copaiba removed by ammonium carbonate solution is amorphous, and gives amorphous salts. The sodium carbonate soluble acids are also chiefly amorphous, but contain a small quantity of  $\beta$ -meta-copaivic acid, which occurs in sharp-pointed prismatic crystals, melting at  $89-90^{\circ}\text{C}$ ., and having the empirical formula  $\text{C}_{11}\text{H}_{16}\text{O}_2$ , or, possibly,  $\text{C}_{16}\text{H}_{24}\text{O}_3$ , or  $\text{C}_{22}\text{H}_{32}\text{O}_4$ . This latter formula is closely allied to the metacopaivic acid of Strauss, isolated in 1868, to which the formula  $\text{C}_{22}\text{H}_{34}\text{O}_4$  was given, but which could not be detected by the author. From another specimen of Maracaibo balsam hexagonal pyramids or scales of illurinic acid,  $\text{C}_{20}\text{H}_{28}\text{O}_3$  were isolated. By treating the resins soluble in sodium carbonate with a large excess of petroleum ether, the substance which imparts the green fluorescence to the balsam was isolated, as an insoluble residue, which, when dried, was a greenish-blue light powder.

**Pará Copaiba.** In addition to amorphous acid resins and indifferent resene, E. Keto finds that Pará copaiba yields two crystalline resin acids. One of these, para-copaivic acid, is soluble in ammonium carbonate solution, and occurs in sharp or quadratic leaflets melting at  $145-148^{\circ}\text{C}$ ., and has the formula  $\text{C}_{20}\text{H}_{32}\text{O}_3$ . The other, insoluble in ammonium carbonate, is homo-para-copaivic

acid,  $C_{18}H_{28}O_3$ , crystallizing in pointed needles, which melt at  $111-112^\circ C$ .

*African Copaiba.* The author confirms the statement of J. C. Umney (*Year-Book*, **1892**, 168, and **1893**, 421) as to the constant presence in African copaiba of an acid resin which separates in well-formed crystals. He finds that this acid occurs to the extent of two or three per cent. When quite pure it melts at  $128-129^\circ C$ ., and has the empirical formula  $C_{20}H_{28}O_3$ ; it has been named illurinic acid. It forms a sodium salt,  $NaC_{20}H_{27}O_3 \cdot 6H_2O$  (?) which is at first amorphous, but gradually assumes the form of minute crystalline needles. The barium salt is characteristic; when an ethereal solution of the acid is shaken with baryta water, a few needles are at first formed, and then suddenly the whole ethereal layer is covered with a network of fine white needles having the constitution  $Ba(C_{20}H_{27}O_3)_2 \cdot 4H_2O$ . The lead salt also crystallizes in white needles. The silver salt is amorphous. Illurinic acid is strongly lævo-rotatory, its specific rotation in alcoholic solution being  $\alpha_D = -54.89^\circ$ ; it is dimorphous. From its behaviour with iodine the presence of two ethylene groups in the molecule is indicated. The identity of this body with the oxycopaivic acid of Fehling is probable, but it is not established. No copaivic acid of Rose and Schweitzer, nor the meta-copaivic acid of Strauss, were isolated from African copaiba. In general behaviour illurinic acid closely resembles certain of the coniferous resin acids, especially pimaric acid.

**Copaifera bracteata, Two New Colouring Principles in** E. Kleerekoper. (*Pharm. Centr.*, **42**, 675, after *Ned. Tijdschr. voor Pharm.*) Two new colouring bodies, phœnin and phœnicein, have been isolated from the purple wood of *Copaifera bracteata*. The powdered wood is extracted with alcohol, and the residue, after distilling off the solvent, treated with acetic ether; the residue from this, crystallized from water, after treatment with animal charcoal, yields phœnin in deep violet crystals, which have the formula  $C_{14}H_{16}O_7$ , and are soluble in alcohol and ether, but not in chloroform, benzin, or benzol. By treatment with dilute acids, phœnin is converted into phœnicein. Alkalis give a blue colour with phœnin.

**Cordia excelsa, Presence of Alantoin in.** H. Thoms. (*Pharm. Post*, **34**, 634.) The so-called cordianine of Von Peckholt, isolated by extracting the fresh leaves and bark of *Cordia excelsa* with alcohol, is found to be identical with alantoin,  $C_4H_6N_2O_3$ , which has been found in the amniotic liquor of animals, and in the urine

of new-born children. It has previously been isolated in plants, in the shoots of *Platanus orientalis* grown in water, by Schultze and Barbieri, and in the bark of the horse chestnut, by Schultze and Bosshart. In animals it is doubtless formed by the oxidation of urea or uric acid, but in plants it is probably derived from vegetable albumin, since the two former bodies have not been found in plant secretions, nor have they ever been detected in the excreta of vegetable-eating birds, although they are known to be present in that of carnivorous birds. The fresh leaves of *Cordia excelsa* yield 0.266 per cent. of the base, and the fresh bark 0.78 per cent. By repeated recrystallization it is obtained in white crystalline columns, which melt, with decomposition, at 224°C.

**Corn Oil, Chemistry of.** H. T. Vulté and H. W. Gibson. (*Journ. Amer. Chem. Soc.*, **22**, 453, and **23**, 1.) The following constants were found as a result of closely agreeing determinations on three different samples: Sp. gr. at 15.5°C., 0.921–0.9255; Reichert value, 4.0–10.1; iodine value, 113.3–119.7; acetyl value, 10.7–11.8; saponification value, 191.5–193.7; Maumené test, 74–75°; Hühner value, 88.1–93.2; Valenta test, 44–74°. Phytosterol, or rather the unsaponifiable matter, amounted to 1.4 per cent. A dark brown coloration is produced by Becchi's test and an intense black by Brullé's test. Stearic, palmitic, oleic, linoleic, ricinoleic, formic, and probably caproic, caprylic and capric acids had been previously found in corn oil. The presence in it also of acetic, hypogaeic and arachidic acids was proved by this investigation; that of formic acid was also confirmed. The Reichert value is the highest of any seed oil. The nature of the volatile oil present was not considered.

**Corydalis Alkaloids.** J. Gadamer. (*Archiv.*, **240**, 19.) Attention is directed to the analogy between the bases isolated from *Corydalis cava* and the alkaloids of opium. Although protopine has not yet been isolated from the roots of *Corydalis*, it has been stated by Battandier to occur in the herb; its occurrence in the root may either have been overlooked in the presence of so many other bases, or its place may be taken by corycavamine,  $C_{21}H_{23}NO_5$ , which may prove to be homologous to protopine,  $C_{20}H_{19}NO_5$ . In all, no less than eleven bases have been found in corydalis roots. These are: corydaline,  $C_{22}H_{27}NO_4$ , m.p., 134.5°C.; corybulbine,  $C_{21}H_{25}NO_4$ , m.p., 238–239°C.; corycavine,  $C_{25}H_{23}NO_6$ , m.p., 216–217°C.; bulbocapnine,  $C_{19}H_{19}NO_4$ , m.p., 199°C.; corytuberine,  $C_{19}H_{25}NO_4$ , melting above 200°C.; corydine,

an amorphous base, m.p., 65–75°C.; isocorybulbine, a weak base; corycavamine, more strongly basic; and two amorphous bases, one of which gives a crystalline, the other an amorphous hydrochloride, and a base melting at 135°C., which is not identical with corydaline.

**Cotton Seed Oil, Modification of Becchi's Test for.** L. M. Tolman. (*Journ. Amer. Chem. Soc.*, **24**, 396.) It is found that the products of oxidation, which often cause rancid, but otherwise pure olive oil to give a brown coloration with Becchi's silver nitrate test, may be entirely eliminated by first shaking the oil with an equal volume of alcohol, 95 per cent. The separated oil is then tested in the usual way. The reducing body in cotton seed oil is not removed by this preliminary treatment with alcohol.

**Coumarin in *Peristrophe angustifolia*.** Hans Molisch. (*Apoth. Zeit.*, **22**, 45.) The leaves of *Peristrophe angustifolia*, a native of Java, develop, when dried, a marked odour of coumarin, which is more pronounced if the drying be slowly conducted at a temperature of 60°C. If, however, the fresh leaves be first heated to 100° by boiling, and then dried, no such odour is developed. The same result has been obtained with the leaves of *Ageratum*, which, although fragrant when dried, give off no odour if previously treated with boiling water, or with absolute alcohol. It is probable, therefore, that the formation of coumarin depends upon the action of a specific ferment, which is destroyed by boiling or by the action of alcohol.

**Couso, Constituents of.** A. Lobeck. (*Archiv der Pharm.*, **239**, 672.) The author has obtained from couso:  $\alpha$ - and  $\beta$ -cosin, cosotoxin, protocosin and cosidin. The cosin of Merck is separated by repeated crystallization from alcohol into two bodies,  $\alpha$ - and  $\beta$ -cosin. *Alpha-cosin*, m.p., 160°C., forms long, lemon-yellow needles, containing two methoxyl and three hydroxyl groups. Analyses obtained agreed closely with the formula proposed by Dacomo and Malignini, namely,  $C_{21}H_{24}(OCH_3)_2O_5$ . *Beta-cosin*, m.p., 120°C., crystallizes in yellow prisms. Being more soluble in alcohol, it is obtained from the mother liquor after separating  $\alpha$ -cosin. It has the same centesimal composition as  $\alpha$ -cosin, and also contains two methoxyl groups. Cosidin and protocosin, isolated from couso flowers, are both crystalline, while cosotoxin is amorphous. These principles are isolated by treating the ethereal extract of couso with sufficient magnesia to produce a pulverulent mass. This is extracted with water, and the aqueous

extract is acidified with dilute  $\text{H}_2\text{SO}_4$ . The precipitate thus formed is collected, washed and dried. It is then dissolved in the smallest possible volume of methylic alcohol and allowed to crystallize by spontaneous evaporation. The crystals which are deposited are purified by recrystallization from alcohol. They consist of *protocosin*. It differs from the *protocosin* of Leichsenring in having a higher m.p.,  $182^\circ\text{C}$ ., instead of  $176^\circ\text{C}$ ., as stated by that investigator. It occurs in colourless, minute, glittering needles, readily soluble in ether, benzol, chloroform, acetone, and hot alcohol; less soluble in cold alcohol, and insoluble in water. The formula attributed to it by Leichsenring,  $\text{C}_{29}\text{H}_{38}\text{O}_9$ , is confirmed. It probably occurs in the form of an anhydride, which by crystallization from alcohol containing water gives *protocosin*, according to the equation  $\text{C}_{58}\text{H}_{74}\text{O}_{17} + \text{H}_2\text{O} = 2\text{C}_{29}\text{H}_{38}\text{O}_9$ . It contains two methoxyl groups, but the small amount in which it exists has precluded further examination. The mother liquors are then distilled, and allowed to evaporate *in vacuo* over  $\text{H}_2\text{SO}_4$ . The syrupy residue thus obtained is first extracted with petroleum ether, then dissolved in ether. This ethereal solution is precipitated with petroleum ether, and, the orange-red precipitate having been separated by filtration, the solution is distilled to a syrupy consistence and set aside. It forms a crystalline deposit of colourless tablets, which is the new compound *cosidin*,  $\text{C}_{31}\text{H}_{46}\text{O}_{11}$ , m.p.,  $178^\circ\text{C}$ . It contains two methoxyl groups, and gives butyric acid when decomposed with concentrated  $\text{H}_2\text{SO}_4$ . The mother liquor from this forms a reddish-yellow resinoid mass, which, when extracted with 10 per cent.  $\text{Na}_2\text{CO}_3$  solution, gives *cosotoxin* on neutralizing with an acid. It is amorphous, melting at  $62^\circ\text{C}$ . (Leichsenring gives  $80^\circ$  as the m.p.). Its centesimal composition agrees with the formula  $\text{C}_{26}\text{H}_{34}\text{O}_{10}$ . It contains but one methoxyl group, and should probably be considered as being  $\text{C}_{52}\text{H}_{68}\text{O}_{20}$ . When reduced with zinc dust and  $\text{NaOH}$  it affords butyric acid and trimethyl-phloroglucin  $\text{C}_9\text{H}_{12}\text{O}_3$ ; with  $\text{H}_2\text{SO}_4$  a small quantity of the latter body is also formed, pointing to the analogy of the active principles of cousoo with those of male fern.

In consequence of the scarcity of cousoo, original bundles of the dried flowering herb have not been obtainable in recent years; the quality of the detached flowers offered has shown a marked deterioration. The same applies to the ethereal extract of cousoo, which, as at present met with in Continental commerce, is so eminently unsatisfactory that the author considers that its use in medicine should be abandoned.

**Cupric Hydrate and Metallic Salts, Combinations of.** A. Mailhe. (*Comptes rend.*, **133**, 226, and **134**, 43.) Tetracupric hydrate  $\text{Cu}_4\text{O}_3(\text{OH})_2$  gives, when boiled with a solution of  $\text{HgCl}_2$ , an amorphous green powder, which is the basic salt  $\text{HgCl}_2 \cdot 3\text{CuO} + \text{H}_2\text{O}$ . With zinc chloride, in the cold it gradually forms a blue crystalline powder, composed of minute, hexagonal crystals having the composition  $\text{ZnCl}_2 \cdot 3\text{CuO} + 4\text{H}_2\text{O}$ . With  $\text{ZnBr}_2$  it forms  $\text{ZnBr}_2 \cdot 3\text{CuO} + 4\text{H}_2\text{O}$  in small six-rayed stellate crystals. Black cupric oxide, when heated with  $\text{ZnBr}_2$ , forms the salt  $\text{ZnBr}_2 \cdot 3\text{CuO} + 2\text{H}_2\text{O}$  in small green hexagons. Tetracupric hydrate rapidly forms a basic salt with cold solutions of manganese chloride,  $\text{MnCl}_2 \cdot 2\text{CuO} + 6\text{H}_2\text{O}$ . With  $\text{CoCl}_2$  it gives a green, crystalline powder,  $\text{CoCl}_2 \cdot 3\text{CuO} + 4\text{H}_2\text{O}$ , and with  $\text{NiCl}_2$  a pale green, micro-crystalline powder,  $\text{NiCl}_2 \cdot 2\text{CuO} + 6\text{H}_2\text{O}$ , and a corresponding basic salt with  $\text{NiBr}_2$ .  $\text{CdCl}_2$  yields a grey, crystalline precipitate of  $\text{CdCl}_2 \cdot 2\text{CuO} + 6\text{H}_2\text{O}$ . In all cases the combination takes place slowly in the cold, and more rapidly on heating.

Tetracupric hydrate, when left in contact for several months, in the cold, with a moderately concentrated solution of cadmium sulphate, is entirely converted into a bluish-green powder composed of hexagonal tablets, having the composition  $2\text{CdSO}_4 \cdot 3\text{CuO} + 12\text{H}_2\text{O}$ . If the mixture be maintained at 25 to 30°C., the combination is complete in a few days. On boiling the mixture, crystals containing 2 mols. less  $\text{H}_2\text{O}$  are obtained. Nickel sulphate, under like conditions, gives green, quadrangular scales of  $2\text{NiSO}_4 \cdot 3\text{CuO} + 12\text{H}_2\text{O}$ , and, on boiling, a similar salt with ten mols.  $\text{H}_2\text{O}$ . Cobalt sulphate, after a time, gives a precipitate of quadratic crystals, often grouped to form spheroids, which have the formula  $3\text{CoSO}_4 \cdot 5\text{CuO} + 16\text{H}_2\text{O}$ . On boiling, hexagonal tablets, exhibiting a marked birefringence are obtained, which are  $2\text{Co}_2\text{SO}_4 \cdot 3\text{CuO} + 10\text{H}_2\text{O}$ . Zinc sulphate solutions combine with tetracupric hydrate in proportions varying with the strength of the solution. When one sixth or less of a molecular weight of zinc sulphate is present, birefringent, hexagonal lamellæ of  $\text{ZnSO}_4 \cdot 3\text{CuO} + 5\text{H}_2\text{O}$  are obtained. If from 1 to 3 molecular weights be used either the compounds  $2\text{ZnSO}_4 \cdot 3\text{CuO} + 12\text{H}_2\text{O}$  or  $2\text{CuSO}_4 \cdot 3\text{ZnO} + 12\text{H}_2\text{O}$  result. If from 1 to  $\frac{1}{2}$  of a molecular weight of  $\text{ZnSO}_4$  be employed, either the basic salt  $\text{ZnSO}_4 \cdot 2\text{CuO} + 5\text{H}_2\text{O}$  or the double salt  $2\text{ZnSO}_4 \cdot 3\text{CuO} + 12\text{H}_2\text{O}$  is formed, according to the amount of cupric tetrahydrate present. With between  $\frac{1}{2}$  and  $\frac{1}{3}$  of a molecular weight either the result is the salt  $\text{ZnSO}_4 \cdot 3\text{CuO} + 5\text{H}_2\text{O}$  or a mixture of that body with  $2\text{ZnSO}_4 \cdot 3\text{CuO} + 12\text{H}_2\text{O}$ . The last is



always the product resulting on boiling together zinc sulphate solutions and cupric tetrahydrate. It is also formed on boiling black cupric oxide with solution of zinc sulphate.

**Dacryodes Resin, Essential Oil of.** (*Schimmel's Report, October, 1901, 20.*) The resin of *Dacryodes hexandra* yields about 16 per cent. of a yellowish, mobile essential oil with an aromatic, terebinthinous odour. Sp. gr. 0.8875;  $[\alpha]_D = -13^\circ 20$ . Its constituents have not yet been investigated. (See also *Year-Book, 1899, 163.*)

**Dammara Orientalis, Constitution of the Resin of.** A. Tschirch and M. Koch. (*Archiv der Pharm., 240, 202.*) Two samples of the resin have been examined—one a soft, dull resin, the other hard and shining. The soft resin yielded, when the ethereal solution was shaken out with successive solvents, according to the author's process, Mancopalinic acid  $C_8H_{12}O_2$  and mancopalenic acid  $C_8H_{14}O_2$  together, 4 per cent., both soluble in ammonium carbonate solution. Sodium carbonate solution removed  $\alpha$ - and  $\beta$ -mancopalolic acids, together, 75 per cent. The portion insoluble in caustic soda solution consisted of resene  $C_{20}H_{32}O$ , 12 per cent., and volatile oil, 6 per cent. Mancopalinic acid is crystalline, occurring in needles, melting at  $175^\circ C$ . The other acids are amorphous. The hard resin differed from the above solely in containing no mancopolinic or mancopalenic acids, and therefore yielding nothing soluble in ammonium carbonate solution.

**Dielytra spectabilis, Protopine in.** J. Gadamer. (*Chem.-Centr., 72 [2], 814, after Apoth. Zeit., 16, 621.*) The root of *Dielytra spectabilis* is found to contain about 1 per cent. of protopine  $C_{20}H_{19}NO_5$  m.p.  $201$ – $202^\circ C$ . It is obtained, accompanied by small quantities of other bases, by extracting the powdered root with alcohol acidified with acetic acid; after recovering the solvent, the aqueous solution of the bases is made alkaline with ammonia and shaken out with ether. The alkaloids thus removed are converted into hydrochlorides and crystallized, the bases again liberated, and protopine obtained in the pure condition by recrystallization from a chloroform-acetic-ether menstruum. Protopine has previously been recorded by Battandier as occurring in the closely-allied *Dielytra formosa*.

**Digestive Action, Determination of the Relative Amount of.** F. Thomas and W. Weber. (*Pharm. Zeit., 46, 936.*) Dry casein is employed as the digestion material instead of moist egg albumin, milk casein, or fibrin, all of which, from the varying amount of water they contain, must of necessity give discordant

results. For pancreatic ferments a neutral solution of casein, obtained by dissolving dry casein, 5 Gm., in water, 250 c.c., containing 4 c.c. of N/10 NaOH solution is employed. The pancreatic material is digested with this at 40°C. for one hour, after which time the unattacked casein is precipitated with saturated sodium sulphate solution in the presence of excess of sulphuric acid. The casein thus thrown out is in a granular condition, which is readily collected and washed; it is then dried and weighed. For papain, the solution of casein should be made distinctly alkaline, and for pepsin, free HCl in the proportion of 0.1 per cent. should be present, and a temperature of 38–39°C. employed. For the above quantity of casein the equivalent of 0.1 Gm. of pancreatin or 0.25 Gm. of pepsin should be used.

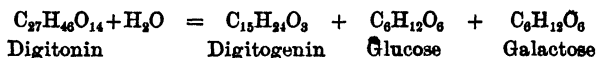
**Digitalin, Composition of Commercial German.** H. Kiliani. (*Berichte*, 39, 3560.) The author has found that German digitalin comprises four glucosides—*Digitarin*, which is identical with the crystalline digitalin of Nativelle; *Digitonin*, obtained in an impure and amorphous state by Schmiedeberg, but isolated in crystals by the author; *Digitalein*, which differs from the body of that name of Nativelle, which latter the author has not found; *Digitalin*, identical with that of Schmiedeberg, but obtained in a crystalline condition and not amorphous as stated by that author. Commercial digitalin is dissolved in warm alcohol 95 per cent., and the solution, after cooling, is treated with ether and set aside. The digitonin is thus precipitated. This is filtered off, the solution distilled and evaporated until a pellicle forms. The syrupy residue thus obtained is treated with  $1\frac{1}{2}$  times its volume of water, poured into a large excess of ether and allowed to stand for several days. The aqueous layer is then removed and again treated with ether as long as that solvent is coloured. The digitalin is thus precipitated as a gelatinous mass, which is collected and drained slowly on a pressure filter, then washed very cautiously with water containing 5 per cent. of alcohol. This operation requires many days to complete; the gelatinous mass is then dried on a porous tile, recrystallized from alcohol 95 per cent. Digitalein is found in the filtrate from which it is isolated by the method described by the author (*Year-Book*, 1900, 45). The impure digitonin at first precipitated is dissolved in warm alcohol 85 per cent., and allowed to stand for 48 hours, when it separates in a crystalline mass which is collected, washed with alcohol 85 per cent., and dried on porous plates. Commercial German digitalin contains 40 to 50 per cent. of this body. When purified

by recrystallization it has the formula  $C_{27}H_{46}O_{14} + 5H_2O$  and not  $C_{27}H_{47}O_{14} + H_2O$  as stated by Cloetta.

**Digitalis, Assay of.** W. Stoeder. (*Oester. Zeits. für Pharm.*, **39**, 836.) Digitalis leaves should yield from 0.25 to 0.35 percent. of digitoxin when assayed by the following process:—20 Gm. of dry powdered leaves is digested on the water bath with frequent agitation with 200 c.c. of water for one hour. After cooling, the weight is made up to 220 Gm. with more water, strained, pressed, and allowed to settle. 150 c.c. of this liquid is then filtered off (=15 Gm. of leaves), transferred to a separator, and shaken up with 75 c.c. of chloroform and 5 c.c. of solution of ammonia, repeatedly, for twelve hours. 1 c.c. of the aqueous solution is then withdrawn, shaken out with ether, the ethereal portion separated, the ether evaporated, and the residue treated with 2 c.c. of glacial acetic acid containing a drop of  $Fe_2Cl_6$  solution. This, when poured on sulphuric acid, should not show a red zone with a blue colour above it. 60 c.c. of the chloroformic solution is then withdrawn (=12 Gm. of powder), and evaporated to leave about 2 c.c. of residue. This is cooled, 10 c.c. of ether is added to it, filtered if necessary, and then 50 c.c. of petroleum ether is gradually added. The mixture is left to subside for twenty-four hours, the liquid is decanted, the precipitate washed with 5 c.c. of petroleum ether collected, dried at  $100^{\circ}C.$ , and weighed.

**Digitoflavone Identical with Luteolin.** H. Kiliani and O. Mayer. (*Berichte*, **34**, 3577.) The authors find that the so-called digitoflavone is identical with Perkins' luteolin, and therefore suggest that the former name should be dropped. It gives, on fusion with KHO, phloroglucin and protocatechuic acid; and the latter is converted into tetrabenzoyl-luteolin, melting at  $200.5^{\circ}C.$  by the method of Deninger. Digitoflavone further agrees with luteolin in all its general colour reactions.

**Digitogenin and Digitogenic Acid.** H. Kiliani and Merck. (*Berichte*, **34**, 3562.) H. Kiliani (*Year-Book*, **1893**, 60) has previously shown that digitonin when hydrolized with HCl splits up into digitogenin, glucose and galactose, according to the equation:—



By modifying the process a better yield of digitogenin is obtained. This, by oxidation, furnishes digitogenic acid  $C_{14}H_{24}O_4$ , of which numerous derivatives are described.

**Dorstenia klaineana**, **New Constituents of.** Heckel and Schlagdenhauffen. (*Pharm. Centralh.*, **43**, 70.) From the petroleum ether extract of the roots of *Dorstenia klaineana*, the Gaboon ivy, "Ilondo" and "Enzenezi" of the natives, the authors have isolated a new crystalline principle, pseudo-coumarin,  $C_{12}H_5O_3$ , melting at  $180^{\circ}C$ . The alcoholic extract contains resinous matter and tannin. From *Dorstenia braziliensis* another crystalline substance melting at  $189^{\circ}C$ . is obtained by extraction with petroleum ether. The resins extracted by alcohol resemble those obtained from *Dorstenia klaineana*. This last root is distinguished from that of *Dorstenia braziliensis* and also from *Dorstenia contrayerva* by the coumarin-like odour it gives off.

**Elemi, African.** A. Tschirch and J. Cremer. (*Archiv der Pharm.*, **34**, 317.) African elemi contains: Aframyrin,  $C_{30}H_{50}O$ , 20-25 per cent.; afelemisic acid,  $C_{44}H_{80}O_4$ , 8-10 per cent.; volatile oil, 15-20 per cent.; afeleeresene,  $C_{30}H_{50}O_2$ , 40-45 per cent. These substances were extracted in exactly the same way as those from Manila elemi. Afelemisic acid is amorphous and melts at  $97-98^{\circ}$ . Aframyrin forms glancing needles melting at  $170^{\circ}C$ . The great bulk of the volatile oil distils between 160 and  $175^{\circ}C$ . has the sp. gr. 0.953, and an odour similar to the oil of Manila elemi. Afeleeresene is an amorphous white powder melting from  $70-73^{\circ}C$ .

**Elemi, Manila, Constituents of.** A. Tschirch and J. Cremer. (*Archiv der Pharm.*, **240**, 272.) The hard and soft varieties of Manila elemi are found to have the same constituents in different proportions, as shown in the following table:—

|                                                         | Soft variety. | Hard variety. |
|---------------------------------------------------------|---------------|---------------|
| Manamyrin, $C_{30}H_{50}O$ . . . . .                    | 20-25%        | 20-25%        |
| Volatile oil . . . . .                                  | 20-25%        | 7- 8%         |
| Bryoidin, $C_{21}H_{44}O_3$ . . . . .                   | 0.8- 1%       | 1-1.5%        |
| $\alpha$ -Manelemisic acid, $C_{37}H_{56}O_4$ . . . . . | 5- 6%         | 8- 9%         |
| $\beta$ -Manelemisic acid, $C_{44}H_{80}O_4$ . . . . .  | 8-10%         | 6- 8%         |
| Maneleeresene, $C_{15}H_{30}O$ . . . . .                | 30-35%        | 30-35%        |
| Bitter principles and inorganic matter                  | 1- 2%         | 1- 2%         |
| Impurities . . . . .                                    | 5- 6%         | 15-20%        |

$\alpha$ - and  $\beta$ -manelemisic acids were obtained by shaking the ethereal solution of the resin with KOH. solution.  $\alpha$ -manelemisic acid forms good crystals, melting at  $215^{\circ}C$ .;  $\beta$ -manelemisic acid is an amorphous white powder of characteristic odour. It melts at  $75-76^{\circ}C$ .

**Manamyryn** was obtained from the residue after extraction of  $\alpha$ - and  $\beta$ -manelemisic acids. It forms long needles melting at 170–171°C. As shown by Vesterberg (*Year-Book*, 1888, 57), this body consists of  $\alpha$ - and  $\beta$ -amyryn. The authors succeeded in separating these, and obtained melting points for them, which agree with those given by Vesterberg.  $\alpha$ -Amyryn crystallizes in prisms, melting at 191–192°, and  $\beta$ -amyryn in long needles melting at 181°C.

**Bryoidin** was extracted by treating elemi with 22 per cent. alcohol and gently warming. It crystallizes in glancing prisms, melting at 135.5°C.

The volatile oil has a pleasant odour resembling that of dill. The chief portion distils between 170–175°C., and has a sp. gr. 0.955.

**Maneleresene** remains after removal of the foregoing bodies and impurities. It is a white amorphous powder melting at 63–65°C.

**Elemi, Yucatan, Constituents of.** A. Tschirch and J. Cremer. (*Archiv.*, 240, 374.) Yucatan elemi is found to consist of Yucamyryn,  $C_{30}H_{50}O$ , 10–15 per cent.; yuceleresene,  $C_{21}H_{41}O$ , 60–70 per cent.; volatile oil, 8–10 per cent.; bitter principles, 4–5 per cent.

Yucamyryn consists of  $\alpha$ - and  $\beta$ -amyryn. The greater part of the volatile oil distils between 175° and 180°C., and has a sp. gr. 0.945; it possesses a similar odour to the oil from Manila elemi.

Yuceleresene was obtained in similar manner to maneleresene, and is a white powder melting at 75–77°C.

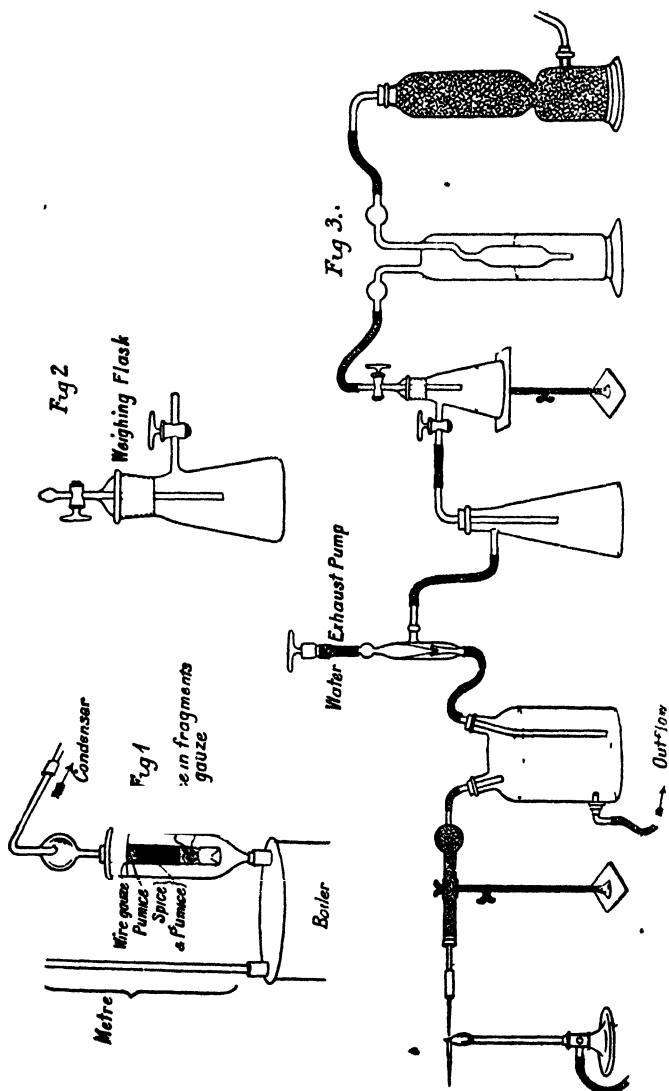
**Erepsin, A New Intestinal Ferment.** O. Cohnheim. (*L'Union Pharm.*, 43, 55.) A new enzyme, peculiar to the intestinal mucous membrane, has been isolated. It differs from trypsin in not peptonizing fibrin, but is very active on proteoses and peptones, transforming them into soluble bodies which are not proteoses, since they do not give the biuret reaction. These products are not coagulated by heat, but are precipitated by phospho-molybdic acid. The action is obtained, independent of the membrane itself, with filtered macerations of intestinal tissues it is, in fact, a soluble enzyme.

**Eschscholtzia californica, Constituents of.** R. Fischer (*Archiv.*, 239, 421) finds that the chief bases present in the flowering herb of *Eschscholtzia californica* are protopine,  $C_{20}H_{19}NO_5$ ,  $\beta$ - and  $\gamma$ -homo-chelidonine,  $C_{21}H_{23}NO_5$ , and probably traces of sanguinarine and chelerythrine. The protopine and homo-chelidonine are identical in every respect with the same bases

isolated from *Sanguinaria* and from *Glaucium*. *Eschscholtzia* contains no morphine.

**Essential Oils. Determination of.** C. Mann. (*Archiv der Pharm.*, **240**, 146.) The author has devised an apparatus, a figure of which is given, by means of which complete exhaustion of any material containing essential oil may be effected in a comparatively short time without the production of an unmanageable volume of watery distillate. It consists essentially of a small glass cylinder perforated at the bottom (Fig. 1), in which the drug, previously mixed with coarsely powdered pumice stone, is packed, the blocking of the lower aperture being prevented and free passage of steam rendered possible by the previous introduction of wire gauze and coarsely powdered pumice. The upper portion of the cylinder is connected with an ordinary splash-trap, which, in its turn, is fitted to the condenser. Round this cylinder is a larger one, closed at the top with a cork, through which the stem of the splash-trap leading from the inner cylinder passes. This communicates with the boiler and forms a steam jacket from which the steam passes through the drug by the lower orifice of the inner cylinder. The arrangement closely resembles that of a Soxhlet's extractor except that the direction of extraction by steam is reversed. Twenty Gm. is usually a convenient amount of material to employ for analysis. The distillate is collected in a flask or measuring cylinder holding 1-1½ litres, furnished with a long neck which is graduated into 25 c.c.; sufficient clean salt is dissolved in it to give a 25 per cent. solution, and the essential oil is shaken out with 50 c.c. of rhigolene (light petroleum spirit) specially prepared by fractionating commercial petroleum spirit, and collecting only the portion boiling between 20-35°C., consisting chiefly of pentane and hexane. After agitation and separation, sufficient water is added to bring the layer of rhigolene into the neck of the flask, and more rhigolene is added to make up to 50 c.c. To determine the amount of oil 25 c.c. of the rhigolene (= 10 Gm. of the drug) is pipetted out of the flask and placed in a specially-constructed weighing bottle, capacity about 100 c.c. (Fig. 2.) This merely consists of a flask with a side tube and a tapped tube-perforated stopper, which allows a current of dry air to be drawn through the flask. The air, after passage over the usual desiccator, being drawn into the apparatus by the side tube and out through the stopper, which is connected with a water exhaust pump as shown in Fig. 3. The apparatus is so arranged that the issuing air may be ignited from

a jet as a test of the presence of rhigolene in the vapour. The



author states that the presence of even 0.0005 Gm. of rhigolene in the weighing bottle can be detected by this flame test. When all

the volatile solvent is evaporated off, the residual oil is weighed. Good results have been obtained with a number of drugs and spices containing essential oils.

*Determination of Essential Oils in Liqueurs.* If nothing but the oils, alcohol, water and sugar be present, about 100 c.c. should be taken diluted with about 500 c.c. of distilled water and the mixture then saturated with salt; 50 c.c. of rhigolene are then added, well shaken with the liquid and allowed to separate. 25 c.c. of the rhigolene are pipetted off and treated as previously described. If the liqueur contain resins, chlorophyll, etc., the shaking with rhigolene is performed as described above. Half (25 c.c.) of the rhigolene is then transferred to the distilling apparatus, which has previously been charged with pure cellulose and some pieces of pumice stone. As soon as the transference is complete the apparatus is closed and the rhigolene containing the oil is distilled over. The rhigolene is diluted to 50 c.c.; 25 c.c. are then taken and treated as described before. In this case the percentage is found by multiplying by 4.

*Determination of Essential Oils in Soap.* 20 Gm. of the soap is shaved and then dissolved in 150 c.c. water and 20 Gm. 90 per cent. alcohol by gentle heat. When cold, the solution neutralized with dilute  $\text{H}_2\text{SO}_4$ , and then 1 drop of the acid is added in excess to produce a faint turbidity. Excess of salt is now added, about 1.5 Gm. of tannin, and a few pieces of pumice. The mixture is now distilled and the distillate treated as previously described. In distilling, a burner should be placed under the flask so as to keep the amount of water in the flask constant.

*Determination of Essential Oils in Perfumes.* If uncoloured, such as handkerchief perfumes, they may be treated as described for liqueurs not containing resins, etc. Otherwise they should be treated in the same way as liqueurs containing resins, etc., except that 5 to 10 Gm. should be taken instead of 100 c.c.

**Esters in Plants, Formation of.** E. Charabot and A. Hébert. (*Bull. Soc. Chim.* [3], **25**, 884.) The authors consider that esters are formed in plants by the direct action of acids on alcohols, in the presence of a dehydrating agent, which, in the living plant is possibly a ferment. When esterification is conducted in the laboratory, employing a small quantity of  $\text{H}_2\text{SO}_4$  as the dehydrating agent, it is found that when action ceases, and a state of equilibrium is reached, the ratio of ester to alcohol closely approaches that which is found to occur in nature. Direct esterification by simple contact is very slow at ordinary temperatures.



In the case of linalol and acetic acid, only 1 per cent. of the alcohol was converted into ester in 24 days, while in the living plant of *Lavandula vera* the authors have found 8 per cent. of the total alcohol to be esterified in 8 days. Evidently some body is present in the plant which accelerates esterification. If, however,  $\frac{1}{36}$  of a molecular weight of  $H_2SO_4$  be employed as a dehydrating agent, results are obtained *in vitro* which closely approximate those observed in the living plant. It is found that the ester which predominates in plants is invariably that of the acid which is most abundant in its tissues. When two alcohols are treated together with an acid and the dehydrating sulphuric acid in the proportion above indicated, they are found to yield esters in the same relative proportions as occur in plants. The alcohols and acids experimented with comprised geraniol with acetic, propionic and butyric acids; linalol with acetic acid; thujol with acetic and valerianic acids; in each instance 1 molecular weight of the alcohol, 6 molecular weights of the acid, and  $\frac{1}{36}$  of a molecular weight of  $H_2SO_4$  were employed. The amounts of alcohols and esters were determined by means of the solvent action of solution of sodium salicylate on the former, by the method of Duyk. (*Year-Book*, 1900, 93).

**Esters, Quantitative Formation and Determination of, from Alcohols or Phenols.** A. Verley and F. Boelsing. (*Berichte*, 34, 3354.) Mixtures of alcohols or phenols with acid anhydrides, which only react slowly in the cold, give a rapid reaction, accompanied by the evolution of heat and are esterified almost immediately, on the addition of pyridine according to the equation  $R.OH + (R'.CO)_2O + Py = R.O.COR' + R'COOH.Py$ . The method is eminently suitable for the determination of alcohols or phenols in essential oils. For this purpose a mixture of perfectly anhydrous pyridine 88 Gm. and acetic anhydride 12 Gm. is employed. One or two Gm. of the alcohol or phenol is heated with 25 c.c. of this mixture for 15 minutes; it is then treated with 25 c.c. of water, and the amount of free acid determined with semi-normal alkali, using phenolphthalein as an indicator; the difference in the amount of free acid found, compared with that of a blank experiment, without alcohol or phenol, gives the amount of acid combined as ester, and, by inference, the quantity of either of those bodies present. Satisfactory results were obtained with ethyl, amyl and cinnamyl alcohols, phenylglycol, glycerol, phenol,  $\beta$ -naphthol, guaiacol, thymol, eugenol, carvacrol and santalol; but with terpineol, vanillin, salicaldehyde, benzylalcohol and linalol no de-

finite results were obtained. With geraniol—containing fractions of geranium oil which had been esterified with phthalic anhydride, only 90 per cent. of the geraniol present could be found by this method. With menthol, a larger excess of acetic anhydride than mentioned above is necessary to obtain quantitative results.

**Ethane and Methane, New Synthesis of.** H. Moissan. (*Comptes rend.*, **134**, 389.) By heating together ethyl iodide and potassium hydride in a sealed tube to 180-200°C. ethane and potassium iodide are formed according to the equation  $C_2H_5I + KH = C_2H_6 + KI$ . When methyl chloride and potassium hydride are treated together under similar conditions a like reaction takes place, methane and potassium chloride resulting, according to the equation  $CH_3Cl + KH = CH_4 + KCl$ .

**Ethyl Bromide, Commercial.** J. P. Gilmour. (*Pharm. Journ.* [4], **14**, 490.) In fifty samples of commercial ethyl bromide examined, the author found only one perfectly pure specimen, which was of French manufacture. The following were the tests applied: (1) If equal volumes of ethyl bromide and distilled water are agitated together, there should be no volume alteration (alcohol), and the separated watery layer should not redden blue litmus paper nor give any precipitate with silver nitrate (absence of hydrobromic acid and bromine). (2) Agitated with its own volume of pure concentrated sulphuric acid, no yellow or other coloration ought to appear, even after the lapse of an hour (absence of organic compounds of sulphur and ethylene and amyl compounds). (3) If drops of the sample be allowed to fall gently into a layer of potassium iodide solution (1:5), the drops, on reaching the bottom of the vessel, should not have acquired a violet colour (absence of free bromine). The chief physical tests are volatilization without residue, and the absence of a garlic odour.

Of the 50 specimens to which all the foregoing tests were applied, 30 were utterly unfit for anæsthetic purposes, owing to the presence of deleterious compounds; 25 contained free hydrobromic acid, and 2 free bromine; 20 had a distinct garlic odour (phosphoretted hydrogen), 40 when subjected to the sulphuric acid test developed the characteristic coloration due to sulphur, ethylene, and amyl compounds, and 10 showed the yellow colour said to indicate the presence of organic compounds of sulphur.

**Eucalyptus Oils, Characters and Constituents of some Hitherto Unrecorded.** R. T. Baker. (*Schimmel's Report*, Oct., 1901, 27, and April, 1902, 39, after *Proc. Linn. Soc., New South Wales*.

*Eucalyptus angophoroides*. Apple-top box. Yield 0.185 per cent. The crude oil has the sp. gr. 0.9049, and the  $[\alpha]_D = -12.7^\circ$ . When rectified it contains 26 per cent. of cineol, with much phellandrene and a little pinene.

*E. delegatensis*. White ash; silver-topped mountain ash. Yield 1.7 per cent. of pale lemon yellow oil; sp. gr. 0.8602;  $[\alpha]_D = -68.12^\circ$ . It contains no cineol nor eudesmol, and is chiefly composed of lævo-phellandrene.

*E. Fletcheri*. Lignum vitæ or black box. Yield 0.29 per cent.; sp. gr. 0.8805;  $[\alpha]_D = -14.2^\circ$ . It contains but little cineol, and much phellandrene.

*E. intermedia*. Bloodwood, or bastard bloodwood. Yield 0.125 per cent.; sp. gr. 0.8829;  $[\alpha]_D = +11.2^\circ$ . It consists chiefly of pinene with a little cineol. The oil from trees grown in the neighbourhood of Sydney differs from the above in optical rotation, being lævogyre to approximately the same extent.

*E. intertexta*. Spotted gum. Yield not above 0.64 per cent.; sp. gr. 0.9078;  $[\alpha]_D = +10.7^\circ$ . It contains about 37 per cent. of cineol. The oil is of a brownish-yellow colour.

*E. lactea*. Spotted gum. Yield 0.541 per cent. Sp. gr. 0.8826 for the crude oil, or 0.8788 when rectified. The former is optically inactive; the latter shows a slight activity. It contains no phellandrene.

*E. Morrisii*. Grey mallee. Yield 1.69 per cent; sp. gr. 0.9097;  $[\alpha]_D = +6.7^\circ$ . It contains from 50 to 60 per cent. of cineol, but no phellandrene or eudesmol.

*E. nigra*. Black stringy bark. Yields only a very small amount of oil.

*E. ovalifolia*. Red box. Yield 0.27 per cent. Sp. gr. 0.9058;  $[\alpha]_D = -9.93^\circ$ . It contains much phellandrene, and but little cineol.

*E. polybracteata*. Blue mallee. Yield in December 1.35 per cent. The crude oil has a faint lemon colour, and a strong odour of cineol. It contains volatile aldehydes as well as free acids and esters in small quantity. Sp. gr. 0.9143;  $[\alpha]_D = -2.13^\circ$ . On fractional distillation 91 per cent. comes over below  $183^\circ\text{C}$ ., and this distillate contains 57 per cent. of cineol.

*E. pulverulenta*. The oil of this species, examined by Schimmel, was found to have the sp. gr. 0.9217;  $[\alpha]_D = +1.4'$ . It was soluble in 2 volumes of alcohol 70 per cent. It had a strong odour of cineol, and gave only a very faint phellandrene reaction. It might therefore be used as a substitute for the oil of *E. globulus*.

*E. umbra*. Stringy bark. Bastard white mahogany. This eucalypt yielded (R. T. Baker) 0.155 to 0.169 per cent. of oil; sp. gr. 0.8901–0.8903;  $[\alpha]_D = +41.5$  to  $+43.8^\circ$ . It contains much dextropinene, a little cineol, and an acetic ester, which gives the original oil the saponification number 35.8.

*E. viridis*. Green, red, or brown mallee. Yield 1.06 per cent. of pale brownish-yellow oil, sp. gr. 0.9006;  $[\alpha]_D = -8.9$ , with an odour recalling that of cuminaldehyde. This body H. G. Smith has identified as a new aldehyde, aromadendral (*vide infra*).

*E. vitrea*. White-top messmate. Yield 1.48 per cent.; sp. gr. 0.886;  $[\alpha]_D = -33.9^\circ$ . The oil is colourless; it contains much phellandrene, and from 20 to 26 per cent. of cineol; also citral in the higher boiling fractions.

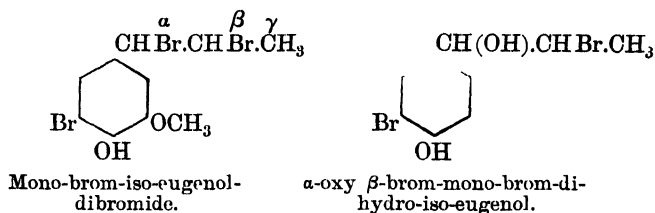
*E. wilkinsonia* var. *hamastoma* F. v. M. *E. lavopinea* var. *minor* Baker. Yield 0.9 per cent.; sp. gr. 0.894;  $[\alpha]_D = -23.9^\circ$ ; 86 per cent. distils over below  $170^\circ\text{C}$ ., and consists chiefly of lævopinene. At some seasons of the year the oil contains a little cineol: at others phellandrene; it also contains a small amount of an ester.

*E. woollsiana*. Mallee box. Yield 0.495 per cent.; sp. gr. 0.889;  $[\alpha]_D = -13.7^\circ$ . It contains only a little cineol, but some aromadendral, which appears to be a characteristic constituent of the eucalypts of the "box" genus.

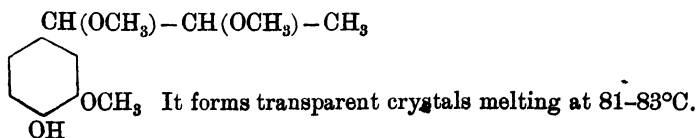
**Eucalyptus Oils, Occurrence of a New Aldehyde in Certain.** H. G. Smith. (*Journ. Roy. Soc., New South Wales*, **34**, through *Schimmel's Report*, Oct., **1901**, 29.) The presence of a body having an odour recalling that of cuminaldehyde has been noticed in many kinds of eucalyptus oils. This is found to be due to a new aldehyde, *aromadendral*,  $\text{C}_{10}\text{H}_{14}\text{O}$ , which has been isolated from the higher boiling fractions of the oil of *E. hemiphloia* by means of sodium bisulphite. The new aldehyde, liberated from the bisulphite compound, was found to be a light-yellow mobile liquid, having a distinctive aromatic odour, the sp. gr. 0.9478 and the  $[\alpha]_D = -49.19^\circ$ . It boils with decomposition at  $210^\circ\text{C}$ . Its oxime melts at  $84^\circ$ , its phenylhydrazone at  $105^\circ$ , with decomposition. It is oxidized by chromic acid, giving an acid  $\text{C}_{10}\text{H}_{14}\text{O}_2$ , melting at  $110^\circ\text{C}$ . With permanganate in alkaline solution, more complete oxidation results, with the formation of cineol, and an acid melting at  $259$ – $260^\circ\text{C}$ ., which is converted into an anhydride on heating, melting at  $152^\circ\text{C}$ . It is, therefore, not cineolic acid.

**Eucalyptus Oils, Peppermint Odour in.** H. G. Smith. (*Proceedings Royal Soc., New South Wales*, through *Nature*, **65**, 192.) The author has isolated the constituent to which the peculiar peppermint-like odour of certain eucalyptus oils is due. It is found in *Eucalyptus piperita*, *E. dives*, and *E. radiata*, and many other species which are, in consequence, popularly known as "peppermints." It occurs in the greatest quantity in the oil of *E. dives*. It is probably a new ketone, differing from menthone. Cineol is generally absent from those oils in which it is met with.

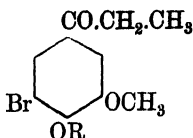
**Eugenol and Iso-eugenol, the Bromides of.** K. Auwers and O. Mueller. (*Berichte*, **35**, 114, through *Centr. Blatt.*) It is found that bromine in the alpha position (next the benzene carbon atom) is easily substituted by the action of alcohol, aqueous acetone, or sodium acetate, but that the  $\beta$ -bromine atom is not replaced even at higher temperatures and in presence of large excess of the reacting radicle. Replacement of the  $\beta$ -bromine atom can, however, be effected by treating with sodium aldyls thus: mono-brom-iso-eugenol-dibromide—prepared by action of bromine dissolved in  $\text{CS}_2$  upon iso-eugenol dissolved in  $\text{CS}_2$ —gives by standing 10 hours with aqueous acetone  $\alpha$ -oxy- $\beta$ -brom-mono-brom-dihydro-iso-eugenol,



This compound forms crystals melting at  $135\text{--}136^\circ\text{C}$ . By action of sodium methylate on the dibromide- $\alpha$ - $\beta$ -dimethoxy-mono-brom-dihydro-iso-eugenol results of the following constitution:—

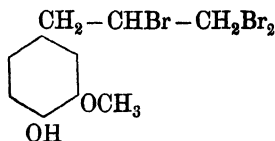


It is interesting to note that Hill and Wallach obtained by action of sodium methylate on the ethers of these dibromides, ketones of the following formula, in which R = any radicle:—



Iso-eugenol-dibromide was similarly prepared and gave analogous reactions.

Dibrom-eugenol-dibromide

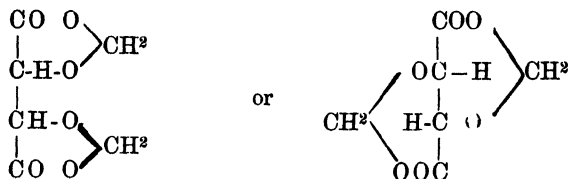


was prepared, and since it does not contain a bromine atom in the  $\alpha$  position, it does not react with alcohol, aqueous acetone, or sodium acetate. Von Boyen and Gussmann have stated that this body cannot be dissolved in alkali. The authors show that it can be dissolved and precipitated unaltered, but that in alkaline solution it undergoes decomposition after a time.

**Excoecaria glandulosa, Green Ebony, Constituents of.** A. G. Perkin and S. H. C. Briggs. (*Proc. Chem. Soc.*, **18**, 11.) Green ebony wood contains two crystalline colouring matters—excoecarin and jacarandin—in minute quantity. Excoecarin,  $\text{C}_{13}\text{H}_{12}\text{O}_5$ , occurs in yellow needles (m.p.  $219\text{--}221^\circ\text{C}$ .), and is described as a weak, substantive dyestuff with animal fibres. It forms a tribenzoyl compound,  $\text{C}_{13}\text{H}_9\text{O}_5(\text{C}_7\text{H}_5\text{O})_3$ , which occurs in colourless needles (m.p.  $168\text{--}171^\circ\text{C}$ .) and a dimethyl ester m.p.  $117\text{--}119^\circ$ , in yellow needles, giving fluorescent solutions. On fusion with alkali it yields hydrotoluquinone ( $\text{CH}_3\text{:O:O}=1\text{:}2\text{:}5$ ), and hydroquinone carboxylic acid, the latter being apparently derived from hydrotoluquinone. Treated with bromine in presence of alcoholic potassium acetate, it forms excoecarone,  $\text{C}_{13}\text{H}_{10}\text{O}_6$ , the copper-coloured needles (m.p. abt.  $250^\circ\text{C}$ .) of which are reconverted into excoecarin on reduction. Alcoholic quinone solution gives a similar compound ( $\text{C}_{19}\text{H}_{14}\text{O}_7$ ?) in green leaflets (m.p.  $190^\circ\text{C}$ .), which is possibly a quinhedrone derivative. Jacarandin,  $\text{C}_{14}\text{H}_{12}\text{O}_5$ , yellow plates, m.p.  $243\text{--}245^\circ\text{C}$ ., resembles luteolin in dyeing property, and gives a diacetyl derivative,  $\text{C}_{14}\text{H}_{10}\text{O}_5(\text{C}_2\text{H}_3\text{O})_2$ , in yellow needles (m.p.  $192\text{--}194^\circ\text{C}$ .), and a dibenzoyl derivative,  $\text{C}_{14}\text{H}_{10}\text{O}_5(\text{C}_7\text{H}_5\text{O})_2$ , in yellow prismatic needles (m.p.  $167\text{--}169^\circ\text{C}$ .). With alcoholic potassium

acetate yellow needles of the salt,  $C_{28}H_{23}O_{10}K$ , result, and on fusion with alkali, an acid, apparently derived from catechol, is formed. The wood also contains two orange-coloured resins, one of which is a yellow dyestuff, while the other is devoid of any tinctorial property.

**Formaldehyde, Action of, on Tartaric and Citric Acids.** W. Sternberg. (*Pharm. Zeit.*, **46**, 1003.) By heating together a mixture of tartaric acid and solution of formaldehyde in an oil bath at  $140-150^{\circ}$  for some time, then adding  $H_2SO_4$  to the syrupy mass, after cooling, and keeping the mixture at about  $60^{\circ}C$ ., a compound is formed which separates out on cooling with ice. Recrystallized from alcohol, this body forms slender, white needles, m.p.  $120^{\circ}C$ . It is insoluble in cold, but soluble in warm water, with partial decomposition. It has the formula  $C_6H_6O_6$  and is considered to be dimethylene tartrate. Its composition is not precisely determined, but the author considers that one of the two following formulæ indicates its structure:—



The compound of formaldehyde and citric acid is easily prepared by evaporating a mixture of citric acid 200, hydrochloric 150, and formalin 100, to dryness on a water bath. The product is recrystallized from hot water, from which it separates in colourless stellate prisms melting, with decomposition, at about  $205^{\circ}C$ . It has the formula  $C_7H_8O_7$ , methylene citric acid, and is dibasic.

**Formaldehyde, Determination of, by Means of Silver Nitrate.** Vanino. (*Pharm. Zeit.*, through *Répertoire*, **14**, 83.) When formaldehyde is added to a solution of silver nitrate and caustic soda, the precipitate thrown down consists of a mixture of metallic silver and silver oxide. On treating this with dilute acid, the latter is dissolved, only the metallic silver being left insoluble. On this reaction the following analytical process is based. A known quantity of the formaldehyde to be tested is diluted with 9 parts of water, and to 5 c.c. of this dilution an aqueous solution of 2 Gm. of silver nitrate is added, followed by sufficient solution

of soda to give a distinct alkaline reaction. After agitation and subsidence, the supernatant liquor is decanted, and the precipitate treated with excess of 5 per cent. acetic acid. The insoluble metallic silver is then collected on a filter, and washed with water acidulated with acetic acid until the filtrate gives no precipitate with hydrochloric acid. The precipitate is then dried and weighed. Every 216 parts of  $\text{Ag} = 30$  parts of  $\text{H.CHO}$ .

**Formic Acid, New Synthesis of.** H. Moissan. (*Comptes rend.*, **134**, 261.) By heating potassium hydride in a current of dry  $\text{CO}_2$ , the gas is absorbed and potassium formate produced according to the equation  $\text{CO}_2 + \text{KH} = \text{HCOOK}$ . On treating the salt with  $\text{H}_2\text{SO}_4$  and distilling, pure formic acid is obtained. In a similar manner, by substituting  $\text{CO}$  gas, the same salt is obtained and a deposit of carbon left, as shown by the equation  $2\text{CO} + \text{KH} = \text{H.COOK} + \text{C}$ .

**Gallic Acid, some Derivatives of.** F. B. Power and F. Shedden. (*Proc. Chem. Soc.*, **17**, 243.) The authors have prepared and described the following derivatives of gallic acid.

*Ethyl dinitrodiacetyl gallate*,  $\text{C}_6(\text{NO}_2)_2(\text{C}_2\text{H}_3\text{O}_2)_2\text{OH.CO}_2\text{C}_2\text{H}_5$ , was prepared by the nitration of ethyl triacetyl gallate, m.p.  $133^\circ\text{C}$ . It forms lemon-yellow needles, m.p.  $165^\circ\text{C}$ .

*Ethyl dinitrotriacylgallate*,  $\text{C}_6(\text{NO}_2)_2(\text{C}_2\text{H}_3\text{O}_2)_3\text{CO}_2\text{C}_2\text{H}_5$ , was prepared from the preceding compound by the action of acetic anhydride. It forms colourless needles, m.p.  $145\text{--}146^\circ\text{C}$ ., which gradually become yellow. Its cold alcoholic solution gives no reaction with ferric chloride, but, on boiling, a bluish-green colour is produced.

*Ethyl dinitrogallate*,  $\text{C}_6(\text{NO}_2)_2(\text{OH})_3\text{CO}_2\text{C}_2\text{H}_5$ . When an alcoholic solution of ethyl dinitrodiacetyl gallate is boiled with sodium ethoxide and allowed to stand, the sodium salt of ethyl dinitrogallate was deposited as a bright-red crystalline powder. From the aqueous solution of the latter, hydrochloric acid precipitates ethyl dinitrogallate in the form of small yellow scales which melt at  $153\text{--}154^\circ\text{C}$ . The same compound was obtained by boiling ethyl dinitrodiacetyl gallate with 50 per cent. sulphuric acid.

*Ethyl monamidogallate hydrochloride*,  $\text{C}_6\text{H}(\text{NH}_2)(\text{OH})_3\text{CO}_2\text{C}_2\text{H}_5\text{HCl.H}_2\text{O}$ , was obtained, together with the diamido-derivative, by the reduction of ethyl dinitrogallate with tin and hydrochloric acid. It forms white needle-shaped crystals, which melt at  $210^\circ\text{C}$ . with decomposition. It can be precipitated from its aqueous solution by the addition of strong hydrochloric acid.



*Diazoethylgallate*,  $\text{C}_6\text{H}(\text{OH})_2\text{CO}_2\text{C}_2\text{H}_5\cdot\text{N}=\text{O}$ , was obtained by the action of nitrous acid on ethyl monamidogallate. When recrystallized from dilute acetic acid it forms fine, reddish-brown needles, which melt with sudden decomposition at  $182^\circ\text{C}$ . When heated with water in a sealed tube at  $220^\circ$  for four hours, the nitrogen is completely eliminated and ethyl gallate is produced.

*Ethyl diamidogallate hydrochloride*,  $\text{C}_6(\text{NH}_2)_2(\text{OH})_3\cdot\text{CO}_2\text{C}_2\text{H}_5\cdot 2\text{HCl}$ , was obtained, together with the above described monamido-derivative, by the reduction of ethyl dinitrogallate. It melts with decomposition at  $197^\circ\text{C}$ ., and is very easily oxidized. It dissolves readily in water, and the solution almost immediately becomes blue, the colour being intensified by the addition of a very little ferric chloride, but destroyed by an excess.

**Gambier and Acacia Catechus.** A. G. Perkin and E. Yoshitake. (*Proc. Chem. Soc.*, **18**, 139.) Gambier catechu contains two catechins (*b*) and (*c*), and a third (*a*) has been isolated from acacia catechu.

*Catechin (b)* when air dried has the formula  $\text{C}_{15}\text{H}_{14}\text{O}_6 + 4\text{H}_2\text{O}$ . It melts at  $175\text{--}176^\circ\text{C}$ ., and forms colourless needles. It agrees with Gautier's (*b*) catechin and gives on fusion with alkali, phloroglucinol, protocatechuic acid and an acid resembling acetic acid. The characters of its derivatives are described.

*Catechin (c)*  $\text{C}_{15}\text{H}_{14}\text{O}_6$  contains no water of crystallization. It forms colourless prisms melting at  $235\text{--}237^\circ\text{C}$ . It only occurs in minute quantity.

*Catechin (a)*  $\text{C}_{15}\text{H}_{14}\text{O}_6 + 3\text{H}_2\text{O}$  or less, probably  $\text{C}_{14}\text{H}_{11}\text{O}_6 + 3\text{H}_2\text{O}$ , forms colourless needles melting at  $204\text{--}205^\circ\text{C}$ ., and agrees with Gautier's (*a*) catechin.

**Ginger Oil, Sesquiterpene of.** O. Schreiner and E. Kremers. (*Pharm. Archiv.*, **4**, 63 and 161.) The presence of zingiberene,  $\text{C}_{15}\text{H}_{24}$ , as described by H. von Soden and W. Rojahn (*Ycar-Book*, **1901**, 67), is confirmed. It is found to boil at  $160\text{--}161^\circ\text{C}$ . under 32 mm. pressure; the sp. gr. is 0.8731 at  $20^\circ$  and the  $[\alpha]_D = -73.38^\circ$ . It forms a crystalline hydrochloride,  $\text{C}_{15}\text{H}_{24}\cdot 2\text{HCl}$ , melting at  $168^\circ\text{C}$ .; a nitrosite,  $\text{C}_{15}\text{H}_{24}\text{N}_2\text{O}_3$  m.p.  $97^\circ\text{C}$ .; a nitrosate, m.p.  $86\text{--}88^\circ\text{C}$ .; and a nitrosochloride m.p.  $97^\circ\text{C}$ . The nitroso compound formed by ginger oil is therefore quite distinct from phellandrene nitrite. Incidentally this latter is found, when pure, to melt at  $120\text{--}121^\circ\text{C}$ ., and not at  $105^\circ\text{C}$ ., as stated by Wallach. The *nitrosite* is obtained in fine silky needles by treating a solu-

tion of zingiberene in petroleum ether, kept cold in a freezing mixture, with saturated sodium nitrite solution and glacial acetic acid. The crystalline magma thus obtained is at once pressed, washed with cold water, and recrystallized from hot methyl alcohol, avoiding prolonged heating. If heated only for a few minutes, no crystals will be obtained, and even momentary heating causes some loss, but the silky needles which separate are quite pure after washing. Zingiberene *nitrosate* has not been obtained in a crystalline condition, but it may be readily prepared by dissolving the sesquiterpene in an equal volume of glacial acetic acid, and ethyl nitrite. This solution is cooled in a freezing mixture, and then slowly treated with a mixture of nitric and glacial acetic acids. The mixture becomes thick and viscous; it is then treated with four times its volume of cold alcohol. On shaking, large quantities of the nitrosate separate, which, when washed and purified by dissolving in acetic ether, and precipitating with alcohol, forms a yellowish powder, melting at 86–88°C., with decomposition. The *nitroso-chloride* is obtained as a white precipitate, melting at 96–97°C., by dissolving zingiberene in an equal volume of glacial acetic acid and of ethyl nitrite, cooling the solution in a freezing mixture, and treating with twice the volume of zingiberene used, of a saturated solution of hydrochloric acid gas in glacial acetic acid. After a minute or two the mixture is treated with twice its volume of alcohol, when the nitroso-chloride separates as a flocculent precipitate. This is collected, washed with alcohol, redissolved in acetic ether, and reprecipitated with alcohol.

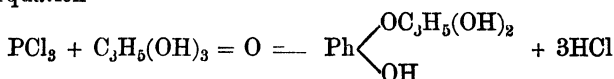
**Glaucium luteum, Alkaloids of.** R. Fischer (*Archiv.*, **239**, 426) has isolated, from the yellow horned-poppy, *glaucine*, which occurs in the herb; *protopine*, in both herb and root, probably accompanied, in the latter, by traces of *chelerythrine* and of *sanguinarine*. No homochelidonine was found in the plant. Glaucine,  $C_{21}H_{25}NO_4$ , occurs as delicate pale-yellow tablets and prisms melting at 119–120°C. It is a very weak base, and is removed from acid or neutral solutions by shaking out with chloroform, which renders its separation from protopine easy. It forms a hydrochloride,  $C_{21}H_{25}NO_4HCl + 3H_2O$ , melting at 232°C., when crystallized from hot alcohol, to which twice its volume of acetic ether has been added. The hydrobromide,  $C_{21}H_{25}NO_4.HBr$ , forms almost colourless crystals melting at about 235°C. With methyl iodide it yields *glaucine-methyl-iodide*,  $C_{21}H_{25}NO_4CHI_3$ , the behaviour of which shows it to be a tertiary base; this com-

pound melts at 210°C. Methoxyl determinations show that it contains four  $\text{OHC}_3$  groups, so that its formula may be written  $\text{C}_{17}\text{H}_{18}(\text{OCH}_3)_4\text{N}$ . The protopine of *Glaucium* is identical with that of many other members of the same order.

**Glucinium, New Volatile Salt of.** G. Urbain and H. Lacombe. (*Comptes rend.*, **133**, 874.) If the amorphous mass, obtained by dissolving glucinium hydrate in dilute acetic acid and evaporating, be extracted with boiling glacial acetic acid, the solution, on cooling, deposits crystalline needles, and as the temperature further decreases, well formed octahedra. This salt is insoluble in cold water; boiling water decomposes it. It is also insoluble in ether and in alcohol, but dissolves in chloroform. It melts at 283–284°C. and distils, without decomposition, at normal pressure at 330–331°C.; its vapour may even be heated to 360°C. without being decomposed. Its vapour density is 13.9 and the formula of the salt  $(\text{CH}_2\text{CO}_3)_6\text{Gl}_4\text{O}$ . The results appear to confirm the supposed diatomicity of glucinium, since the observed formula and vapour density give the atomic weight of the metal as being 9.

**Glucosides and Cane Sugar, Detection of in Vegetable Substances.** E. Bourquelot. (*Comptes rend.*, **133**, 690.) To detect sucrose the use of invertin is recommended; the substance to be examined is extracted with boiling alcohol, the solvent evaporated, after neutralizing any free acids by means of  $\text{CaCO}_3$ , the residue is dissolved in thymolized water, filtered and made up to a definite volume with thymolized water. Two equal volumes are then measured off; one is treated with thymolized solution of invertin, the other used as a blank control; they are left side by side for three days, then, to each, 1 c.c. of basic lead acetate solution is added and the mixture filtered. A polarimetric determination is then made with each filtrate; the difference observed in that treated with invertin will indicate the amount of invert sugar derived from the sucrose present. The invertin reagent is prepared by agitating top yeast with alcohol 95 per cent., draining, and drying at 30°C. One part of the dry product is then triturated with 100 parts of thymolized water and filtered. To detect glucosides, a portion of the liquid, which has been subjected to the action of invertin, is heated to 100°C. to destroy that ferment. After cooling, a little emulsin is added, and the mixture left at ordinary temperature for some days, after which another polarimetric determination is made, when in the presence of a glucoside, a notable increase in the rotation will be noted.

**Glycerophosphorous Acid and its Salts.** A. and L. Lumière and F. Perrin. (*Comptes rend.*, **133**, 643.) Glycerophosphorous acid is obtained by treating a slight excess of glycerin with phosphorous trichloride, keeping the mixture cool, according to the equation—



Hydrochloric acid is removed from the mixture by means of moist silver oxide; after filtration from the AgCl thus formed, the glycerophosphorous acid is saturated with a base, such as lime, and the excess of glycerin removed by means of alcohol, or the original acid mixture may be directly neutralized with lime, evaporated at a low temperature and then treated with alcohol, which removes calcium chloride and glycerin, but precipitates calcium glycerophosphite. Free glycerophosphorous acid has not been isolated, since it tends to saponify on evaporating its solutions. Most of its salts are soluble in water; the calcium compound occurs as a white crystalline, deliquescent powder, permanent in aqueous solution, and not affected by boiling. It rapidly decomposes at 100°C. when treated with a few drops of HCl. The alkaline glycerophosphites are soluble in alcohol; those of barium and calcium are insoluble in that solvent.

**Gold Selenate.** Victor Lehner. (*Journ. Amer. Chem. Soc.*, **14**, 354.) Although indefinite statements as to the action of selenic acid on gold are found in text books, the precise nature of the reaction has not been recorded. It is found that pure selenic acid obtained by decomposing PbSeO<sub>4</sub> with H<sub>2</sub>S and concentrating by evaporation, is without action on gold in the cold, but that on heating solution takes place between 230° and 300°C. At the latter temperature the metal is readily dissolved; SeO<sub>2</sub> is evolved and Au<sub>3</sub>SeO<sub>4</sub> is formed. The salt occurs in very small, yellow crystals, soluble in hot H<sub>2</sub>SeO<sub>4</sub>, forming a reddish-yellow solution which crystallizes on cooling. Although soluble in H<sub>2</sub>SeO<sub>4</sub>, the salt is insoluble in H<sub>2</sub>O, so that it may be precipitated by dilution. On exposure to light, the crystals turn green. The reaction is similar with Ag and Cu, and is analogous to that of H<sub>2</sub>SO<sub>4</sub> with Cu. The solution of gold by H<sub>2</sub>SeO<sub>4</sub> is the only known instance of that metal being dissolved in a simple oxy-acid.

**Guaiacum officinale, Saponin in.** E. Paetzold. (*Chem. Centr.*, **73**, 221, after *Archiv. exper. Pathol.*) The cortex of *Guaiacum officinale* contains a saponin, the wood rather less of

that glucoside, and the resin, but traces. The therapeutic effect of guaiacum preparations is attributed to the presence of this body.

**Hydrastis canadensis, Assay of.** O. Schreiber. (*Pharm. Post.*, **36**, 321.) An examination of hydrastis root at present obtainable in commerce, as represented by ten samples drawn from the chief drug centres, shows that the drug, although varying greatly in the percentage of hydrastine, is of fairly good quality. The poorest contained 2.85 per cent. and the best 4.16 per cent. of that alkaloid. Ten Gm. of the powdered root was dried to constant weight on the water bath, the moisture being thus determined. The dry residue was then moistened with a mixture of ammonia, 5 c.c.; alcohol, 5 c.c., and ether, 30 c.c., and dried. It was then extracted in a Soxhlet with ether; the ether extract shaken out with 15 Gm. of 5 per cent. hydrochloric acid in a graduated cylinder. The ethereal layer was decanted, the acid extract washed with more ether to remove resinous matter, and the ether decanted. The volume of ether over the acid liquor was then adjusted to exactly 50 c.c. Ten c.c. of ammonia was added and the whole well shaken until all the precipitated alkaloid was dissolved in the ethereal layer. After separation, 40 c.c. of this was decanted ( $= \frac{1}{5}$  of the whole), into a tared capsule, about half the ether evaporated off with a gentle heat, the rest allowed to evaporate spontaneously. In this manner almost colourless crystals of hydrastine were obtained which were finally dried to constant weight on the water bath. It is suggested that an official standard for the alkaloidal content of the root and of the fluid extract should be given, and that the lowest permissible limit for the latter should be 2 per cent. of hydrastine.

**Hydrogen Peroxide, Acid Nature of.** G. Bredig. (*Chem. Centr.*, **72**, 14.) Many of the characters of  $H_2O_2$  indicate that it exerts a feeble acid action. It is much less readily shaken out from aqueous solution by ether in the presence of a small quantity of an alkali. The rapidity of the saponification of ethyl acetate is much retarded by the presence of hydrogen peroxide. It reduces the conductivity of alkaline solutions since the an-ions formed oscillate more slowly than the hydroxyl-ions. Everything points to the fact that  $H_2O_2$  is a feeble acid, its salts being hydrolyzed to the same extent as those of hypochlorous acid.

**Hydrogen Peroxide, Examination of.** G. Arth. (*Mon. Scientif.* [4], **15**, 435.) It is found that the method recommended for the detection of oxalic acid, by precipitating neutralized hydrogen

peroxide with  $\text{CaCl}_2$ , is apt to give rise to misleading results, since hydrated calcium peroxide  $\text{CaO}_2 \cdot 8\text{H}_2\text{O}$  is apt to be precipitated at the same time. It may be distinguished by the fact that its solutions in dilute sulphuric acid decompose  $\text{KMnO}_4$  solution, immediately, in the cold, which calcium oxalate does not. It also has a strong alkaline reaction after drying at  $100^\circ$  and effloresces, becoming opaque. The author recommends the titration of hydrogen peroxide with a correctly-prepared N/50 solution of  $\text{KMnO}_4$  containing 5.659 Gm. per litre. On the Continent, the titration is generally made with a solution containing but 3.163 Gm.  $\text{KMnO}_4$  per litre, and in consequence the results obtained in commercial analyses are almost invariably too high, the ratio being 1:0.838, so that a peroxide described as "10 volumes" only contains as a rule 8.38 volumes of available oxygen when it leaves the works. This arbitrary and inaccurate practice should be abandoned, and a correct standard universally adopted for titration.

**Hydroxylamine, a New Colour Reaction for.** W. C. Ball. (*Proc. Chem. Soc.*, 18, 9.) During the course of some experiments on the action of hydroxylamine salts on nickel sulphide, the author obtained an intense purple coloration, which proved eventually to be independent of the presence of nickel or any other metal. The production of this colour is a very delicate test for hydroxylamine, since solutions so dilute as not to reduce Fehling's solution, either in the cold or on boiling, easily respond to this test. The best method of applying the reaction is to boil the hydroxylamine solution with one or two drops of yellow ammonium sulphide solution until a precipitate of sulphur is produced; two or three cubic centimetres of ammonia solution sp. gr. 0.880 are then added, and finally an equal volume of strong pure alcohol. The purple colour thus developed exhibits a characteristic absorption spectrum, consisting of a wide band covering the yellow, orange and part of the green. In stronger solutions the violet and blue are absorbed, and in very strong solutions the green rays also, so that the only light transmitted is a band in the red.

With a dilution of 1 part of hydroxylamine in 2,000 of water the coloration is intense and the band very distinct; with a dilution of 1 part in 300,000 of water, the coloration is still strong, and the band perceptible in 3 centimetres thickness of the solution. By means of this test, hydroxylamine may be detected when the dilution does not exceed 1 part in 500,000 of water.

The production of the colour is well adapted for showing the formation of hydroxylamine by the action of metals, for example, tin, on nitric acid. It also serves as a very good means of distinguishing hydroxylamine from hydrazine, as the latter base does not produce the colour.

The absorption spectrum of the compound appears to be identical with that of Moissan's sulphammonium, obtained by the action of liquid ammonia on sulphur.

**Hyoscine and Atroscine.** O. Hesse. (*Chem. Centr.*, **72** [2], 1313, after *Journ. Prakt. Chem.*) The author deprecates the re-naming of the base called hyoscine by Ladenburg and himself, but renamed scopolamine by Schmidt; since the commercial salt hyoscine hydrobromide  $C_{17}H_{21}O_4N.HBr + 3H_2O$  contains but traces of impurity, and the commercial hydriodide is practically pure, the alteration of the nomenclature is unnecessary and confusing. The difference between the physiological action of hyoscine and "scopolamine" is nil, except when the base contains notable quantities of atroscine. Hyoscine has since been found in many Solanaceous plants. From *Scopolia atropoides* it may be isolated by shaking out with  $CHCl_3$  the acid alkaloidal extract, made faintly alkaline with sodium bicarbonate, converting the base into the hydrobromide, and purifying. Thus obtained, it is a colourless syrupy liquid which dries to a varnish-like mass in thin films. It then melts at  $50^\circ C$ . It is a powerful base. It is soluble in 9.5 parts of water, is decomposed by prolonged contact with fixed alkaline hydrates, but is unaffected by ammonia or ammonium monocarbonate. With  $HCl$  at  $100^\circ C$ . it is converted into oscine, atropaic acid, and tropide. By the action of baryta at  $60^\circ C$ ., atropic acid is formed; by boiling or by the use of potash atropaic acid is obtained. Hyoscine hydrochloride,  $C_{17}H_{21}O_4N.HCl + 2H_2O$  occurs in rough, brilliant crystals from aqueous solutions; from acetone the anhydrous salt is obtained, as a white crystalline powder, melting at  $197^\circ C$ . The gold salt  $C_{17}H_{21}O_4N.HAuCl_4$  forms comb-shaped, yellow crystals, melting at  $198^\circ C$ ., and not at  $205^\circ C$ ., as stated by E. Schmidt. The hydrobromide is obtained in six forms. The anhydrous salt  $C_{17}H_{21}O_4N.HBr$  is obtained from absolute alcohol or acetone solutions as a crystalline powder. From alcohol 97 per cent. the salt crystallizes with half a molecule of water; from 93 per cent. alcohol a salt containing one molecule of water separates; both these crystallize in rhombohedra. From alcohol 60 to 80 per cent. or from very concentrated aqueous solutions, prismatic crystals containing two molecules of

water are obtained. None of these hydrated salts lose water at  $55^{\circ}\text{C}$ . in the exsiccator; they melt at  $90^{\circ}\text{C}$ . From strong aqueous solution long needles containing 3 molecules of  $\text{H}_2\text{O}$  are obtained, which are slowly dehydrated over  $\text{H}_2\text{SO}_4$ . From ordinary aqueous solution large rhombic crystals, also containing 3 molecules of  $\text{H}_2\text{O}$ , are deposited. These soon become cloudy in the exsiccator and become anhydrous. The hydriodide  $\text{C}_{17}\text{H}_{21}\text{O}_4\text{N.HI} + \frac{1}{2}\text{H}_2\text{O}$  forms rough white prisms which melt at  $197^{\circ}\text{C}$ .; these are difficult to dissolve in cold water, but are readily soluble in hot water and in alcohol. The sulphate  $(\text{C}_{17}\text{H}_{21}\text{O}_4\text{N})_2\text{H}_2\text{SO}_4 + 2\text{H}_2\text{O}$  separates in microscopic needles from aqueous solution; from acetone the anhydrous salt is obtained. The salicylate is amorphous, forming a white syrupy liquid. The optical rotation of the hydrobromide, as usually obtained, is  $\alpha_D = -25.7$  to  $-25.9^{\circ}$ ; that of the free base  $\alpha_D = -33.1^{\circ}$ . When purified from the last trace of atrosine, the hydrobromide has the  $\alpha_D = -32.3$  to  $32.9^{\circ}$ ; that of the anhydrous salt crystallized from boiling acetone falls to  $\alpha_D = -29.3^{\circ}$ .

Atrosine  $\text{C}_{17}\text{H}_{21}\text{O}_4\text{N}$  is identical with the inactive scopolamine of E. Schmidt, the hyoscyne of Bender, and the crystalline scopolamine of Luboldt. It crystallizes with two molecules of water and melts at  $36$ – $37^{\circ}\text{C}$ . By partial dehydration the monohydrated base  $\text{C}_{17}\text{H}_{21}\text{O}_4\text{N.H}_2\text{O}$  melting at  $56$ – $57^{\circ}\text{C}$ . is obtained. The anhydrous base melts at  $82$ – $83^{\circ}\text{C}$ . Its solutions are optically inactive. The hydrochloride  $\text{C}_{17}\text{H}_{21}\text{O}_4\text{N.HCl}$  occurs in long needles. The gold salt  $\text{C}_{17}\text{H}_{21}\text{O}_4\text{N.HAuCl}_3$  melts at  $201$ – $202^{\circ}\text{C}$ . Three forms of hydrobromide have been obtained:  $(\text{C}_{17}\text{H}_{21}\text{O}_4\text{N.HBr})_2\text{H}_2\text{O}$  in tabular rhombic crystals from concentrated aqueous solution;  $\text{C}_{17}\text{H}_{21}\text{O}_4\text{N.3H}_2\text{O}$  in flattened rhombic crystals from dilute solutions, and the anhydrous salt, a crystalline powder, from acetone; the last melts at  $181^{\circ}\text{C}$ . The hydriodide  $(\text{C}_{17}\text{H}_{21}\text{O}_4\text{N.HI})_2\text{H}_2\text{O}$  forms prismatic crystals which, when anhydrous, melt at  $192^{\circ}\text{C}$ .

By heating anhydrous hyoscyne hydrobromide above its melting point, the base is converted into atrosine. The free base is unaltered by long keeping at normal temperatures in the dark, but by exposure to light is gradually converted into atrosine; the hydrobromide is similarly altered. Alkaline bicarbonates, lime, and baryta water, are without action at ordinary temperatures, but at  $60^{\circ}\text{C}$ . the latter causes decomposition. A large excess of alkali in alcoholic solution, also causes decomposition; cold dilute aqueous solutions produce no change. A trace of alkali in alcoholic solution, however, brings about the rapid conversion of hyoscyne into



atrosceine. A solution of 10 Gm. of hyosceine hydrobromide in 60 c.c. of alcohol, when left in contact with 0.117 Gm. of NaOH, is wholly converted into atrosceine in ten hours. After neutralizing and removing the alcohol, the base is liberated with soda and shaken out with  $\text{CHCl}_3$ . On evaporating the solvent the residual base is exposed, covered with water in shallow dishes, when it crystallizes. If the temperature be above  $25^\circ\text{C}$ . it is necessary to start crystallization by the addition of a fragment of crystalline atrosceine.

The physiological action of both alkaloids is sedative, without the objectionable after-effects of atropine; both are powerful mydriatics. For medicinal use atrosceine is preferable to hyosceine. Commercial scopolamine hydrobromide contains both alkaloids in varying proportions; the melting point, therefore, ranges from  $178$ – $190^\circ\text{C}$ .

**Hypnotoxin.** P. Portier and C. Richet. (*Comptes rend.*, **134**, 247.) The long filaments of *Physalis* and of other members of the *Celenterata* are found to contain a peculiar toxalbumin which has a stupefying action on their prey, enabling relatively small animals of delicate structure to capture and kill much stronger and more active creatures. The toxalbumin obtained by crushing 2 Gm. of the filaments with sand and straining, is sufficient to kill a pigeon weighing 300 Gm., when injected, in one hour. In about 15 minutes after the injection the animal falls into a profound sleep from which it cannot be awakened by psychic excitement. It becomes quite stupefied and utterly indifferent to its surroundings. The heart-beats are accelerated, but sensibility is almost entirely abolished, while the temperature falls 2 or  $3^\circ\text{C}$ . Death ensues by paralysis of the respiratory movements. From the marked anæsthetic action of the poison, and the trance-like character of the effects it produces, it has been named hypnotoxin. The toxic action is destroyed by exposure to a temperature of about  $55^\circ\text{C}$ .

**Immiscible Solvents and Liquids, An Apparatus for the Centrifugal Separation of.** E. C. Spurge. (*Pharm. Journ.* [4], **14**, 451.) When extracting organic liquids with immiscible solvents, as in the determination of alkaloids, it frequently happens that these become more or less emulsified, and may require to stand a considerable time before separation can be effected.

In order to obtain a rapid and complete separation, the apparatus described has been found very effective. By its aid a determination of Ext. bellad. liq., B.P., can be begun, the eight

washings performed as directed in the B.P. (washing with ammonia water is unnecessary) and the chloroform set to evaporate within twenty-four minutes. The determination of citral, eugenol, etc., by absorption, in Hirschsohn's flasks, is both expedited and made more accurate by use of the apparatus. If, after the absorption is complete, the flasks be filled up and whirled for about two minutes, all the oil is forced up into the neck and a clean surface of separation is obtained. It is, however, necessary to use for this treatment stronger flasks than those usually sold, for they will not stand the pressure.

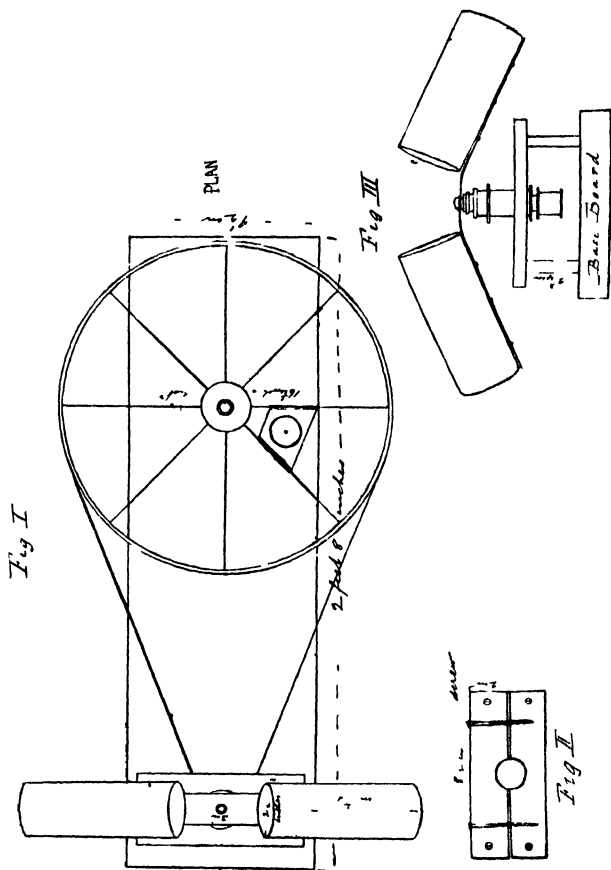
Fig. 1 is a plan of the apparatus. The base-board is of well-seasoned wood,  $1\frac{1}{2}$  in. thick. The driving-wheel is a steering-wheel having thick spokes, such as was used in old-fashioned tricycles. The tyre is removed. A hole is made in the base-board about 9 inches from one end, and a hollow is cut in the under surface of the board, around the hole. Iron washers are placed on both sides of the hole; the axle of the wheel is passed through and nudded down tightly from the under surface of the board. The hollow is made there so that the nut may not project from the under surface. A thick piece of tin plate is soldered to two of the spokes, as shown. A hole is punched in it, and a stout brass rod dropped through the hole so as to rest, when vertical, upon one of the lower spokes (not shown in figure). The rod is secured to the spoke by wire and solder, and to the tin-plate by solder. The groove of a V-shaped piece of tin-plate is soldered to the lower spoke, and the two ends of the V are soldered to the edges of the top plate.

A large cotton reel or perforated wooden bung, slipped over the brass rod, serves as a handle. The bearing for the revolving cases is an old bicycle hub, clamped between two pieces of  $\frac{3}{4}$  in. elm (Fig. 2), mounted on the base-board as shown in Fig. 3. A disc-adjusting hub is best, but a cone-adjusting one will do. An ordinary cotton reel (about 1 in. diameter) is screwed to the lower end of the spindle to serve as a pulley.

Washers are placed at the top end of the spindle, and the cases are nudded down upon them. The cases for containing the separators are made of tin, and are rivetted upon a piece of  $1\frac{1}{2}$  in. hoop iron. They should be lined with stout paper and have a plug of cotton-wool at the ends. The driving belt consists of two Helvetia laces joined by small buckles. To join these no stitching is required; a hole is made in each end of the lace, and the two ends are then slipped over the pin of the buckle. The belt should be kept tight, and

a sprinkling of resin is useful to prevent slipping. The whole apparatus when required for use is fixed to the bench by means of ordinary iron clamps.

As will be seen from the figures, the cases can be readily removed, and various sizes used. It is, of course, better to work



with as small ones as possible, since then greater speed can be attained. Those shown in the figure are about as large as can be conveniently used with a driving-wheel of the diameter given. They will accommodate two Hirschsohn's flasks or two 100 c.c. pear-shaped separators. For alkaloidal work smaller

cases are preferable. The outlet tube of the separators should be cut off close to the tap so as to bring the contents as far away as possible from the centre when centrifugating.

In practice, it is best to centrifugate for about 20 seconds, to draw off the separated liquid as far as possible, and again to whirl for 20-60 seconds, when the remaining solvent can generally be drawn off quite clear. The two arms of the centrifuge must be approximately balanced when in use.

Fitted with cases of suitable size, the apparatus has been used with good results for determining fat in milk by the Leffmann-Beam method, and with the small cases here used a speed of 2,000 revolutions per minute can be attained.

The apparatus is strong, not difficult to make, and should be quite inexpensive. The bicycle hub and driving-wheel can be bought cheaply from almost any cycle repairer, whilst the Helvetia lace and buckles can be obtained from a saddler's.

**Indium and its Salts.** (*Berichte*, **34**, 2763.) Indium, like zinc or copper, is quantitatively precipitated as hydroxide by organic bases, such as di-methyl-aniline, guanidine or piperidine. It should be precipitated from hot solutions in order to obtain it in a dense aggregated form. On ignition, the dried, horny hydroxide leaves the oxide  $\text{In}_2\text{O}_3$ . The hydroxide, like those of Au and Al, forms salts, indates, which are derived from the meta-acid  $\text{InO.OH}$ . The salt  $\text{Mg}(\text{O.OIn})_2 + 3\text{H}_2\text{O}$ , for instance, is obtained as a white, insoluble precipitate on heating together aqueous solutions of  $\text{InCl}_3$  and  $\text{MgCl}_2$ . Indium molybdate  $\text{In}_2(\text{MoO}_4)_3 + 2\text{H}_2\text{O}$  is obtained as a white precipitate when soluble indium salts are precipitated with  $(\text{NH}_4)_2\text{MoO}_4$ . This reagent may be used for the quantitative determination of indium in zinc. Indium platino-cyanide  $\text{In}_2(\text{PtCN})_3 + 2\text{H}_2\text{O}$  (?) is formed in white hygroscopic leaflets which turn yellow on strongly heating, and decompose on mixing solutions of indium sulphate and barium platino-cyanide.

**Iodol, Determination of Iodine in.** B. Sjollemma. (*Nederl. Tijdschr. Pharm.*, **13**, 210.) The iodol is dissolved in dilute caustic soda solution, and boiled until no more pyrrol is volatilized. The residue is then acidulated with N/10  $\text{AgNO}_3$  solution, and titrated back with N/10 thiocyanate solution by Volhardt's method. Commercial iodol preparations were found by this method to contain from 97.6 to 97.7 per cent. of the theoretical amount of iodine.

**I'sano Oil.** A. Hubert. (*L'Union Pharm.*, **43**, 12.) From the kernel of an ovoid drupe of an Oleaceous tree abundant in the neighbourhood of Brazzaville, 60 per cent. of oil, known as

I'sano oil, is obtained by expression. From this, a new fatty acid, isanic acid  $C_{14}H_{20}O_2$ , has been isolated. It occurs in foliaceous crystals; m.p.  $41^\circ C$ . It is very soluble in strong alcohol, and forms crystalline salts with alkalis. It is a powerful purgative, and is probably the active principle of the oil. Both the free acid and its salts are very unstable, rapidly becoming oxidized and developing a deep-red colour.

**Jalapin, Constitution of.** H. Kromer. (*Archiv.*, **239**, 384.) Jalapin is found to be glucosidal jalapinic acid into which three methyl-ethyl-acetic-acid residues have entered, as shown by the formula  $C_{34}H_{63}(C_5H_9O)_3O_{20}$ . When heated with acetic anhydride the pentyl-acetic-ester  $C_{34}H_{58}(C_5H_9O)_3(CH_3CO)_5O_{20}$  is formed. This may be expected to be more active, therapeutically, than jalapin itself. By heating jalapinic acid in sealed tubes to  $135^\circ C$ . with acetic anhydride and anhydrous sodium acetate, ten acetyl groups were combined, the resulting acetyl ester having the constitution  $C_{34}H_{56}(CH_3CO)_{10}O_{20}$ . On hydrolysis, jalapinic acid takes up one molecule of water forming one molecule of jalapinolic acid, and three molecules of a glucose thus,  $C_{34}H_{66}O_{20} + H_2O = C_{16}H_{32}O_3 + 3C_6H_{12}O_6$ .

**Jasmin Oil, Chemistry of.** Albert Hesse. (*Berichte*, **34**, 2916.) The statement that the volatile oil of jasmin flowers cannot be obtained by steam distillation is shown to be incorrect. The apparent cause of this is the solubility of the oil in water, so that it can only be extracted by shaking out the aqueous distillate with ether. By distilling fresh jasmin flowers and treating the distillate in this manner, the yield of oil, 0.194 per cent., was found to be slightly greater than that of the extraction method, 0.174 per cent. The distilled oil had the following characters: opt. rot,  $[\alpha]_D = +4^\circ 15'$ ; sp. gr., 0.968; ester content, calculated as benzylacetate, 39.7 per cent. It contained benzyl alcohol 12 per cent.; other free alcohols 8 to 10 per cent.; benzyl acetate 22.8 per cent.; anthranilic-acid-methyl-ester 1.48 per cent., but no indol. Indol is not a constituent of either the steam distilled oil, or, as previously shown by the author, of the oil extracted by petroleum ether from fresh flowers; it only occurs in the oil of the *enfleurage* process. Methyl anthranilate has also been shown to be absent from the oil obtained with a volatile solvent (*Year-Book*, **1901**, 74). It is found that storing fresh jasmin flowers in an open room does not lead to an increase in the amount of oil, nor does the oil distilled from such flowers contain indol. The residual flowers of

the *enfleurage* process are found still to contain volatile oil. From 150 kilos. of these "exhausted" flowers 7 Gms. of oil was obtained, having the following characters: Sp. gr., 0.889; Opt. rot.,  $[\alpha]_D = + 0^\circ 50'$ ; acid number, 4.5; ester number, 52.8; and by extracting the distillation water with ether, 110 Gm. of oil was obtained, having the sp. gr. 0.9875, opt. rot.,  $[\alpha]_D = + 3^\circ 20'$ . Acid number, 8.5; ester number 197.4. The latter oil contained about 12.5 per cent. of benzyl alcohol, 35 per cent. of benzyl acetate; 1.47 per cent. of methylanthranilate; 3 per cent. of jasmone, but no indol. These waste flowers have hitherto only been used as manure. It appears that the flowers yield by the *enfleurage* process about nine times as much oil as can be obtained by other methods at the time of picking, and that the same amount of oil may be recovered from the "waste" flowers after *enfleurage*, as they yield to steam distillation before being subjected to that process. Indol must be formed during the *enfleurage* either by decomposition or by fermentation, or is a constituent of the volatile exhalations of the flowers. That no indol is formed in stale flowers is against the first theory. Methyl anthranilate, which is not found in the extracted oil, but is present both in the *enfleurage* and distilled oil, is probably the decomposition product of a complex nitrogenous body, which has not yet been isolated.

**Kola Nut and its Preparations, Determination of Total Alkaloids in.** J. Warin. (*Journ. Pharm. Chim.* [6], 15, 373.) *Fluid extract of Kola.* Fifteen Gm. of the fluid extract is evaporated to 7 Gm. This residue is rubbed down with magnesia 10 Gm. and water 2 c.c. The mass is set aside for awhile for reaction to complete, and is then introduced into a dry, wide-mouth, 200 c.c. flask. Chloroform 150 c.c. is then added and the whole weighed. A tube condenser is then fitted to the flask, and the mixture digested on the water bath, so that it boils gently for 45 minutes. After cooling, the contents of the flask are brought to their original weight by the addition of the requisite amount of chloroform, and 100 c.c. is filtered off. The solvent is distilled off, and the residue dried to constant weight, which will be that of the crude total alkaloids in 10 Gm. of fluid extract. The difference in weight between the crude and purified total alkaloids in the case of the fluid extract is so slight that no useful purpose is served by further treating them.

In the case of the powdered drug, however, it is otherwise. The crude alkaloids must be purified before weighing. This is done by digesting them on the water bath with 10 Gm. of HCl diluted with

10 Gm. of water. The acid solution is filtered into a separator, the vessel and filter being well washed with distilled water, then treated with an excess of ammonia and shaken out with three successive washings, each of 20 c.c., of chloroform. This chloroformic extract, on evaporation, leaves the alkaloids pure enough for weighing. 15 Gm. of powder is taken in the first place for assay, mixed with magnesia 10 Gm and water 15 c.c., then treated as described for the fluid extract. Although results obtained with lime show a slightly higher percentage than those with magnesia, the latter is to be preferred, since it is always available in the pharmacy in a pure condition, and further, it does not "bump" when boiled with chloroform, as lime does.

**Lavender Oil, Adulteration of with Benzoic Acid.** (*Schimmel's Report, April, 1902, 46.*) An ingenious fraud, by means of which the apparent ester content of poor lavender oil might be unduly raised, is exposed. Two specimens of lavender oil are reported on, which, until more closely examined, presented no abnormal characters, except an unduly high free acid number. This, however, was found to be due to the presence of approximately 1.5 per cent. of added benzoic acid. It is considered that the adulteration thus detected was only in the experimental stage, and that had it proved successful, a larger and more remunerative proportion of the sophisticating material would have been added.

**Lavender Oil, and East Indian Sandal Oil, Alcohol Solubility Test for.** (*Schimmel's Report, Oct., 1901, 35 and 49.*) Attention is drawn to the unsatisfactory nature of the Ph. G. IV. official test for lavender oil, which prescribes that the oil containing 29 to 30 per cent. of esters should give a clear solution with 3 volumes of dilute alcohol (68 to 69 per cent. by volume). An oil of the official ester content will give a clear solution with 3 to 3.5 volumes of 68 per cent. alcohol, and with 3 volumes of 69 per cent., but on adding more alcohol, 68 per cent., in the first case an opalescence results, while, with 69 per cent., the dilution remains clear. With oils richer in esters than the limit officially recognized, containing about 40 per cent., from 3.5 to 4 volumes of 68 per cent. alcohol, and 3 to 3.5 volumes of 69 per cent., are requisite to produce clear solutions, and even with the stronger alcohol, opalescence results on addition of more of the solvent. It is therefore desirable that a definite strength of alcohol, containing exactly 70 per cent. by volume, should be employed for the test. With this, lavender

oil of good quality will give clear solutions with 2·5 volumes. The same remarks apply to the official (Ph. G. IV.) test for East Indian sandal oil; the alcohol employed should not be the indefinite dilute alcohol 68 to 69 per cent., but exactly 70 per cent. With this a clear solution should be obtained with 5 volumes. (In applying these tests it is important that the prescribed temperature 20°C. should be strictly maintained, since a very slight variation in temperature will materially affect the solubility of the oil in alcohol of minimum strength.—*Ed. Year-Book.*)

**Lead, Radio-active.** F. Gresel. (*Berichte*, **35**, 102.) From the mother liquors of barium radio-bromide a body having all the chemical characters of lead, but showing marked radio-activity, has been isolated. Demarçay finds that this body gives, on spectroscopic examination, two lines which cannot be referred to any known element, but the author considers that these are caused by the radio activity of ordinary lead excited by contact with radium. He controverts the statement of Hoffmann and Strauss that priority for isolating this body belongs to them.

**Leaves, Ash of Powdered.** L. Glaser. (*Pharm. Zeit.*, **46**, 691.) It would seem from the experiments of the author that commercial powdered drugs are, in some instances, met with on the Continent in a grossly adulterated condition. As control experiments he has employed powders either prepared in the pharmacy, or leaves collected, dried, and powdered by himself. The following are the percentages of ash found in the dry powdered leaves: *Belladonna*.—Commercial, 14·6 per cent.; self-gathered, whole leaves, 11·12 per cent. *Coca*.—Commercial, 5·3 per cent.; powdered in pharmacy, 8·1 per cent.; self-powdered, 6·9 per cent. *Digitalis*.—Commercial, 8·8 per cent.; powdered in pharmacy, 7·0 per cent. *Eucalyptus*.—Commercial, 7·7 per cent. *Coltsfoot*.—Commercial, 41·7 per cent.; powdered in pharmacy, 17·9 per cent.; self-powdered, 18·1 per cent.; self-gathered whole leaves, 17·6 per cent. *Jaborandi*.—Commercial, 7·1 per cent. *Walnut*.—Self-powdered, 7·5 per cent. *Marshmallow*.—Commercial, 18·5 per cent.; self-powdered, 17·6 per cent. *Balm*.—Self-powdered, 11·7 per cent. *Peppermint*.—Commercial, 18·5 per cent.; powdered in pharmacy, 11·4 per cent. *Tobacco*.—Self-powdered, 20·2 per cent. *Patchouli*.—Commercial, 22·2 per cent.; self-powdered, 15·7 per cent. *Rosemary*.—Commercial, 6·7 per cent. *Sage*.—Commercial, 45·7 per cent. and 18·5 per cent.; powdered in pharmacy, 9·5 per cent.;



self-gathered whole leaves, 9.4 per cent. *Senna (Alexandrian)*.—Commercial, 11.5 per cent.; the same "without resin," 11.6 per cent. *Senna (Tinnevelly)*.—Commercial, 11.9 per cent. and 11.1 per cent.; powdered in pharmacy, 9.9 per cent. *Stramonium*.—Commercial, 21.3 per cent.; self-gathered whole leaves, 13.3 per cent. *Clover*.—Commercial, 8.2 per cent. *Uva ursi*.—Powdered in pharmacy, 2.4 per cent.

**Lemon Oil, Aldehydes of.** H. von Soden and W. Rojahn. (*Berichte*, **34**, 2809.) Besides citral, lemon oil contains small quantities of nonyl-aldehyde, and probably also octyl-aldehyde. These may be obtained by first separating the citral, by shaking the lemon oil with aqueous solution of  $\text{Na}_2\text{SO}_3$  and  $\text{NaHCO}_3$ , as shown by Tiemann, distilling the washed residual oil *in vacuo*, and shaking the distillate with  $\text{NaHSO}_3$  solution. The bisulphite compound thus obtained is washed with petroleum ether, and the aldehydes regenerated by distilling with  $\text{NaOH}$  solution. On fractionating these aldehydes, the portion boiling at  $185\text{--}190^\circ\text{C}$ . gives with semicarbazide solution, two semicarbazones, separable on fractional crystallization from dilute alcohol. The larger portion, melting at  $89.5^\circ\text{C}$ ., agrees in composition with the semicarbazone of nonyl-aldehyde; the smaller crop, melting at  $72^\circ\text{C}$ ., with that of octyl-aldehyde. The aldehyde recorded by Burgess is probably impure nonyl-aldehyde, and the so-called new blue fluorescent substance, melting at  $145^\circ\text{C}$ ., of the same author, is the citroptene of Crismer. Lemon oil also contains traces of acids which are not volatilized by steam distillation, but which may be removed by shaking out with alkaline carbonates, giving solutions which have a fine pale-blue fluorescence. Parry (*Chem. and Drugg.*, **56**, 993) has previously called attention to the presence of traces of anthranilic-acid-methyl-ester in lemon oil; this may account for the blue fluorescence of the higher boiling fractions of the oil.

**Lemon, Orange and Bergamot Oils, Physical Properties of.** G. H. Ogston and G. Moore. (*Chem. and Drugg.*, **60**, 154.) *Oil of Lemon*. The arrangement adopted in the tables below is to give, for each year, the percentage of the samples examined whose specific gravity or optical rotation lies between the limits given in the first column. To take first the sp. grs., the following results are observed :—

| Sp. Gr.                  | 1898-1899. | 1899-1900. | 1900-1901.  |
|--------------------------|------------|------------|-------------|
|                          | Per cent.  | Per cent.  | Per cent. " |
| 0·855 to 0·856 . . . . . | 1·1        | 8·0        | 7·4         |
| 0·856 " 0·857 . . . . .  | 42·9       | 38·1       | 52·6        |
| 0·857 " 0·858 . . . . .  | 47·2       | 38·8       | 35·9        |
| 0·858 " 0·859 . . . . .  | 8·8        | 14·1       | 8·5         |
| 0·859 " 0·860 . . . . .  | —          | 0·6        | 0·3         |
| 0·860 " 0·861 . . . . .  | —          | 0·4        | 0·3         |

It is seen that the specific gravities of the vast majority of samples lie between the limits 0·856 and 0·858, though genuine oils are met with showing figures greater or less than these. It is found also that, in each year, the specific gravity varies regularly according to the time at which the oil is made. This is illustrated in the following table, which gives the percentage of the samples examined during each period, which had a specific gravity less than 0·857:—

|                          | 1898-1899. | 1899-1900. | 1900-1901. |
|--------------------------|------------|------------|------------|
|                          | Per cent   | Per cent.  | Per cent.  |
| November to January . .  | 66·6       | 70·2       | 77·7       |
| February to April, . . . | 61·3       | 47·5       | 58·7       |
| April to October . . . . | 17·7       | 12·7       | 25·3       |

In each year, therefore, the specific gravity of the oil produced increases as the season advances.

The next table shows the variation in optical rotation in a similar manner to that given above for specific gravity:—

| Year.                   | 1898-1899 | 1899-1900. | 1900-1901. |
|-------------------------|-----------|------------|------------|
|                         | Per cent. | Per cent.  | Per cent.  |
| Below + 58° . . . . .   | 8·0       | 9·0        | 0·8        |
| From + 58-59° . . . . . | 8·5       | 9·0        | 0·8        |
| " + 59-60° . . . . .    | 40·1      | 19·1       | 5·6        |
| " + 60-61° . . . . .    | 31·7      | 24·6       | 12·0       |
| " + 61-62° . . . . .    | 9·1       | 21·9       | 20·3       |
| " + 62-63° . . . . .    | 2·1       | 11·5       | 25·3       |
| " + 63-64° . . . . .    | 0·5       | 3·7        | 24·0       |
| " + 64-65° . . . . .    | —         | 1·0        | 9·3        |
| " + 65-66° . . . . .    | —         | 0·2        | 2·4        |

The rotations were taken at 15·5°C., in a 100 mm. tube.

The difference between the oils of different years is very marked, and it is clear that in laying down limits for sp. gr. and optical

rotation of pure oils it is necessary to have regard to the general characteristics of the season in which they are produced. A figure which would excite suspicion in one year would be perfectly normal in another. This is a point which will be referred to again in connection with bergamot essence.

A peculiarity to be noted is that *machine-made* essence (produced in Calabria, and not often met with in London) so closely resembles in colour the machine-made bergamot oil as to be hardly distinguishable, and has a higher sp. gr. than the ordinary hand-made oil. The few samples of high gravity, 0·859 to 0·861 mentioned in the above tables are samples of this kind. Those having sp. gr. 0·858 to 0·859 come from the Palermo district, the essence from which is, as a rule, heavier than that from the neighbourhood of Messina. In the latter district, taking from Catania on one side to Barcelona on the other, the sp. gr. is always included between the limits 0·856 to 0·858.

An abnormal sample was met with, coming from a district of Palermo, which had an optical rotation of only + 52·5°. This would usually indicate adulteration with about 10 per cent. of turpentine, but fractional distillation showed its purity.

The optical rotation of Palermo essence is generally lower than that of Messina, varying from + 58–62°, as compared with + 59–65° for the latter.

*Oil of Bergamot.* In this case the results are arranged in three tables, one for each year, the figures being, as before, the percentage of the samples examined, which had specific gravities lying between the limits given, and, in addition, the average optical rotation and percentage of linalyl acetate in these samples:—

#### I.—YEAR 1898–1899.

| Sp. Gr.     | Per cent. of Samples. | Average Linalyl Acetate. | Average Rotation. |
|-------------|-----------------------|--------------------------|-------------------|
|             |                       | Per cent.                |                   |
| 0·880–0·881 | 7·4                   | 88·7                     | + 16·5°           |
| 0·881–0·882 | 9·8                   | 82·7                     | + 18·8°           |
| 0·882–0·883 | 37·0                  | 86·5                     | + 14·8°           |
| 0·883–0·884 | 25·9                  | 88·2                     | + 18·3°           |
| 0·884–0·885 | 16·7                  | 89·6                     | + 18·4°           |
| 0·885–0·886 | —                     | —                        | —                 |
| 0·886–0·887 | 8·7                   | 48·7                     | + 7·8°            |

Of the total number of samples, 11 per cent. contained over 40 per cent. linalyl acetate.

## II.—YEAR 1899–1900.

| Sp Gr       | Per cent of Samples | Average Linalyl Acetate | Average Rotation. |
|-------------|---------------------|-------------------------|-------------------|
|             |                     | Per cent                |                   |
| 0 880–0 881 | 1 0                 | 33 26                   | + 16 8°           |
| 0 881–0 882 | 3 2                 | 34 24                   | + 14 5°           |
| 0 882–0 883 | 5 5                 | 35 06                   | + 13 5°           |
| 0 883–0 884 | 11 7                | 36 54                   | + 12 8°           |
| 0 884–0 885 | 16 5                | 37 96                   | + 11 5°           |
| 0 885–0 886 | 24 7                | 39 48                   | + 11 6°           |
| 0 886–0 887 | 19 0                | 41 07                   | + 10 7°           |
| 0 887–0 888 | 10 9                | 42 28                   | + 10 8°           |
| 0 888–0 889 | 5 5                 | 44 16                   | + 8 7°            |
| 0 889–0 890 | 1 6                 | 45 17                   | + 7 0°            |
| 0 890–      | 0 4                 | 47 55                   | + 6 8°            |

Of the samples examined during this season 46 per cent contained over 40 per cent of linalyl acetate

## III — YEAR 1900–1901

| Sp Gr       | Per cent of Samples | Average Linalyl Acetate | Average Rotation |
|-------------|---------------------|-------------------------|------------------|
|             |                     | Per cent                |                  |
| 0 877–0 878 | 1 4                 | 30 56                   | + 23 8°          |
| 0 878–0 879 | 3 1                 | 31 34                   | + 21 4°          |
| 0 879–0 880 | 16 0                | 32 59                   | + 19 6°          |
| 0 880–0 881 | 20 4                | 33 95                   | + 17 7°          |
| 0 881–0 882 | 17 3                | 35 47                   | + 17 3°          |
| 0 882–0 883 | 16 0                | 36 51                   | + 16 8°          |
| 0 883–0 884 | 7 5                 | 36 95                   | + 14 1°          |
| 0 884–0 885 | 5 4                 | 38 80                   | + 13 7°          |
| 0 885–0 886 | 5 1                 | 39 59                   | + 13 6°          |
| 0 886–0 887 | 3 1                 | 39 76                   | + 11 2°          |
| 0 887–0 888 | 2 7                 | 41 48                   | + 12 08°         |
| 0 888–0 889 | 0 8                 | 43 87                   | + 10 0°          |
| 0 889–      | 0 5                 | 44 54                   | + 10 1°          |

The samples exceeding 40 per cent linalyl acetate numbered 89 per cent

*Oil of Orange.* Sp gr, in the great majority of cases, lies between 0 848 and 0 850, and the rotation between + 96 and + 99°. Of seventy samples examined in the season 1899–1900 only three were found outside these limits, and in the following year six samples were met with, having a somewhat higher sp. gr between 0 850 and 0 851, but the rotation of all the pure samples was between the figures named.

When distilled at the ordinary pressure the first 10 per cent. of a pure oil will have an optical rotation greater than that of the original essence by at least  $1^{\circ}$ . Our experience in the past season shows the average rise to have been  $1.60^{\circ}$  (range,  $1.1-2.5^{\circ}$ ). Any oil with the optical rotation of the 10-per-cent. distillate showing a rise of less than  $1^{\circ}$ , may be suspected to contain either oil of lemon or the terpenes therefrom. The following results are from the new season's crop:—

| Sp. Gr. | Opt. Rot. | Rot. of 10 per cent.<br>Dist. | Rise. |
|---------|-----------|-------------------------------|-------|
| 0.84860 | +98.75°   | +99.95°                       | 1.20° |
| 0.84900 | +98.15°   | +99.33°                       | 1.18° |
| 0.84955 | +98.30°   | +99.50°                       | 1.20° |
| 0.84905 | +98.75°   | +99.90°                       | 1.15° |
| 0.84840 | +98.50°   | +99.70°                       | 1.20° |
| 0.84845 | +98.05°   | +99.40°                       | 1.35° |
| 0.84910 | +97.40°   | +98.70°                       | 1.30° |
| 0.84980 | +97.00°   | +98.80°                       | 1.80° |
| 0.84920 | +98.00°   | +99.20°                       | 1.20° |
| 0.84880 | +98.70°   | +99.80°                       | 1.10° |
| 0.84925 | +98.00°   | +99.35°                       | 1.35° |
| 0.84960 | +98.05°   | +99.70°                       | 1.65° |
| 0.84915 | +98.70°   | +99.90°                       | 1.20° |

The next figures are from essences that were found to be impure, and it will be noticed that there is still a rise in the rotation of the distillate.

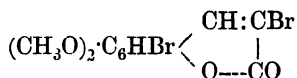
| No. | Sp. Gr. | Opt. Rot. | Rot. of 10 per cent.<br>Dist. | Rise. |
|-----|---------|-----------|-------------------------------|-------|
| 1   | 0.81890 | +95.50°   | +95.58°                       | 0.08° |
| 2   | 0.85020 | +92.30°   | +92.80°                       | 0.5°  |
| 3   | 0.84958 | +95.60°   | +96.20°                       | 0.6°  |
| 4   | 0.84845 | +99.25°   | +99.90°                       | 0.65° |

No. 4 contained orange terpenes; 1, 2, and 3 lemon oil or terpenes. These figures show the statement which has been made, that the first 10 per cent. distilled may have a lower rotation than the original oil, to be incorrect. It has been stated that a fall of  $5^{\circ}$  is possible. Such a figure would certainly indicate adulteration to the extent of at least 30 per cent.

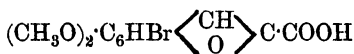
**Lemon Oil, Two New Constituents of.** H. E. Burgess. (*Proc. Chem. Soc.*, 17, 171.) In addition to citral, lemon, and possibly

orange oil also, contains another aldehydic substance, boiling at 80–85°C. at 15 mm., having the  $[\alpha]_D = + 0^\circ 30'$  and refractive index 1.4314 at 20°C. The odour is peculiar, somewhat resembling that of coconut. On shaking with  $H_2O_2$  in the presence of a NaOH solution, the aldehyde is at once polymerized into a crystalline form which may be recrystallized from alcohol. It gives an oxime melting at 35°C. Another crystalline substance occurs in lemon oil, which melts at 145° C. This is sparingly soluble in alcohol, giving fluorescent solutions. It forms a crystalline dibromide.

**Limettin, Constitution of.** W. A. Tilden and H. Burrows. (*Proc. Chem. Soc.*, **17**, 216.) Having previously shown (*Year-Book*, **1892**, 71) that limettin  $C_{11}H_{10}O_4$  has the composition  $C_6H_3 \left\langle \begin{smallmatrix} (OCH_3)_2 \\ C_3HO_2 \end{smallmatrix} \right.$ , further experiments have been undertaken, which, although incomplete, are published, since Burgess (see above) appears to have recorded the same body. The dibromo-compound of limettin melts at 297°C.; on treatment with 10 per cent. KOH solution it yields an acid  $C_{11}H_9O_5Br$ . The second atom of bromine is not eliminated by prolonged treatment with potash. It is therefore probable that the structure of the  $C_3HO_2$  group is similar to that of the ring in coumarin, dibromo-coumarin behaving in a similar manner. Dibromo-limettin may therefore be represented as



from which, by treatment with potash, the corresponding coumarilic acid



is obtained. From the potassium salt of which the methyl ester m.p. 244°C. was obtained.

The following chloro-compounds of limettin have been obtained. Mono-chloro-limettin m.p. 242°C. is not acted on by alkalis. Dichloro-limettin m.p. 275°C. gives with potash mono-chloro-coumarilic acid. The tri-chloro-limettin previously obtained (*loc. cit.*) gives dichloro-coumarilic acid. When limettin is heated on the water bath with sodium ethylate, the sodium salt is quickly deposited. Attempts to methylate limettin were futile, but when its silver salt was heated with methyl iodide in methyl alcohol, regenerated limettin and a crystalline body  $C_{12}H_{12}O_4$ , separating

in tufts of white needles, m.p.  $189^{\circ}\text{C}$ ., were obtained. This latter substance differs from linettin in having one more  $\text{CH}_2$  group.

**Liquorice Juice, Determination of Glycyrrhizic Acid in.** W. Stoeder. (*Pharm. Zeit.*, **46**, 541, after *Pharm. Weekbl.*) 5 Gm of the juice is dissolved in 50 c.c. of water containing 2 c.c. of solution of ammonia. The volume is then made up to 100 c.c. with strong alcohol. 50 c.c. of the mixture is filtered off, evaporated to about 12 c.c., and, after cooling, acidulated with  $\text{HCl}$ . The precipitate which separates is collected, washed with 6 c.c. of water dissolved in ammonia, evaporated to dryness and weighed.

**Lithium Antimonide.** P. Selleau. (*Comptes rend.*, **134**, 231 and 284.) Although antimony and lithium readily combine when heated together, the reaction is so violent that much of the material is lost, and quantitative results are not obtainable. By electrolysis, however, with a mixture of equal parts of the chlorides of potassium and lithium, in a state of fusion, with a cathode of antimony, the combination takes place slowly and regularly, lithium antimonide,  $\text{Li}_3\text{Sb}$  being formed in a crystalline condition, of a deep slate-grey colour. Its melting-point, somewhat above  $950^{\circ}\text{C}$ ., is considerably higher than that of either of its constituents. It decomposes cold water, with the evolution of pure hydrogen. The same body is obtained, but in an amorphous condition, by the action of lithium-ammonium on metallic antimony. Liquefied ammonia alone is without action on antimony, but if fragments of metallic lithium be introduced, the blue colour due to the formation of lithium-ammonium slowly disappears and  $\text{Li}_3\text{Sb}$  is formed. It occurs as a greyish brown, very fine powder, and much less stable than the crystalline form obtained by electrolysis. It has a powerful reducing action, combines readily with  $\text{Cl}$ ,  $\text{Br}$ ,  $\text{I}$ ,  $\text{S}$ ,  $\text{Se}$  and  $\text{Te}$ , and burns in oxygen.

**Lithium Silicide.** H. Moissan. (*Comptes rend.*, **134**, 1083.) By heating together pure silicon and lithium *in vacuo*, gradually raising the temperature so that a dull-red heat is not obtained for two or three hours, a mixture of lithium and lithium silicide is obtained. The excess of lithium is then distilled off *in vacuo* at a temperature between  $400^{\circ}$  and  $500^{\circ}$ . Thus obtained, lithium silicide  $\text{Si}_2\text{Li}_6$  forms small indigo-blue, hygroscopic crystals, having a density of 1.12. It dissociates *in vacuo* above  $600^{\circ}\text{C}$ . In fluorine it burns when gently warmed, forming fused lithium fluoride and gaseous silicon fluoride. It burns in the air when heated on platinum foil and perforates the foil. It ignites in oxygen with a dazzling light, and also combines with violent energy with sul-

phur, selenium, tellurium and phosphorous. It is a powerful reducing agent, attacking chromium sesquioxide, and ferric oxide. If allowed to fall on sulphuric acid, it ignites as potassium does with water, and the same reaction takes place with explosive violence with nitric acid. With hydrochloric acid it also becomes incandescent, but the coating of hydrated silica which is formed round each particle stops the reaction. With dilute HCl it evolves a spontaneously inflammable gas. When thrown into a small amount of water, decomposition is immediate, and a spontaneously inflammable gas is evolved by the alkaline liquid; if, however, the action is retarded by covering the particles of silicide with a layer of glycerine and then adding water, the gas more slowly generated is found to be pure hydrogen, since the hydrogen silicide at first formed is decomposed by the lithium hydrate. Although solution of HCl gas in water decomposes  $\text{Si}_2\text{Li}_6$ , it is remarkable that a solution of that gas in ether is without action, thus affording further evidence of the difference between solution of HCl in ether and in water.

**Male Fern, Fluid Extract of, Determination of Filicic Acid in.** W. Stoeder. (*Pharm. Zeit.*, **46**, 541, after *Pharm. Weekbl.*) 5 Gm. of the extract is dissolved in 20 c.c. of ether, and shaken frequently for one hour with 100 c.c. of 2 per cent.  $\text{Ba}_2\text{HO}$  solution. The supernatant aqueous liquid is then filtered, 86 Gm. of the filtrate (= 4 Gm. of the original extract) is taken, and acidified with 10 c.c. of dilute HCl, then washed out with 40, 30, and 20 c.c. of ether in succession. The bulked ethereal solution is distilled and the residue dissolved in 1 c.c. of amyl alcohol. This solution is set aside for 48 hours in a cold place, then treated with 15 c.c. of methyl alcohol. After standing for 24 hours the precipitate is collected, washed with 5 c.c. of methyl alcohol, dried and weighed.

**Maltol in Pine Needles.** — Feuerstein. (*Berichte*, **36**, 1804.) Maltol  $\text{C}_6\text{H}_6\text{O}_3$  occurs to the extent of 0.5 per cent. in the needles of *Pinus alba*. It has hitherto only been known as a constituent of the products given off on roasting malt.

**Mandragora Alkaloids.** O. Hesse. (*Journ. Prakt. Chem.* [2], **64**, 274.) The bases present in the root were found to amount to 0.417 per cent. The chief alkaloid present was hyoscyamine, accompanied by hyoscyne,  $\text{C}_{17}\text{H}_{21}\text{O}_4\text{N}$ , pseudohyoscyamine,  $\text{C}_{17}\text{H}_{23}\text{O}_3\text{N}$ , and mandragorine,  $\text{C}_{15}\text{H}_{19}\text{O}_2\text{N}$ . The comminuted root was moistened with NaOH and extracted with ether; from the ethereal extract, washing with alkali removed scopolatin. The bases were removed from the ether by shaking out with dilute



$\text{H}_2\text{SO}_4$ , and the mixed sulphates treated with  $\text{NaHCO}_3$ . The precipitate thus formed was dissolved in  $\text{CHCl}_3$  and neutralized with  $\text{HBr}$ , when *hyoscyne* hydrobromide crystallized out. *Pseudo-hyoscyamine* was isolated from the mother liquor after precipitating with  $\text{NaHCO}_3$ . Its hydrobromide could not be crystallized from alcohol. Its gold salt,  $\text{C}_{17}\text{H}_{23}\text{O}_3\text{N} \cdot \text{HAuCl}_4$  formed small crystals melting at  $174^\circ\text{C}$ . *Mandragorine* was isolated from the mother liquors of pseudo-hyoscyamine by treatment with soda, as an oily liquid with a markedly alkaline reaction. Its gold salt,  $\text{C}_{15}\text{H}_{19}\text{O}_2\text{N} \cdot \text{HAuCl}_4$  melted between  $124$ – $126^\circ\text{C}$ . On treating the original solution of the sulphates with  $\text{NaOH}$ , the bulk of the precipitate consisted of hyoscyamine with traces of atropine and an oily base, possibly mandragorine.

**Manganese Phosphates.** V. Auger. (*Comptes rend.*, **133**, 94.) By heating together manganese nitrate 30, with phosphoric acid (sp. gr. 1.714) 100, to  $210^\circ\text{C}$ . and diluting the cold fused product to 1,000 c.c. with water, then adding alcohol 95 per cent. 500 c.c., and digesting on the water bath at  $60$ – $70^\circ\text{C}$ . a deposit of small, chamois-yellow, lozenge-shaped crystals is formed, which have the formula  $\text{Mn}_4\text{P}_6\text{O}_{31} + 14\text{H}_2\text{O}$ . The salt is a pyro-phosphate, giving an alkaline pyrophosphate when decomposed in the cold. It dissolves to a violet solution in sulphuric acid, which turns red. With phosphoric acid it also gives a violet solution, but this soon becomes turbid and colourless and deposits a greyish-white precipitate, probably the neutral phosphate  $\text{MnPO}_4 + \text{H}_2\text{O}$  of Christensen. On dissolving in water the above product of fusing manganese nitrate and phosphoric acid, and allowing the solution to stand for several days, crusts of rose-coloured crystals are obtained, which are obviously a mixture of two or three salts. On mixing together phosphoric anhydride 2 and hydrated manganese oxide 1, heat is evolved and a bright-blue paste is formed which, when dried and purified by levigation, has the formula  $\text{MnP}_3\text{O}_6$ , as previously stated by Herrmann.

**Mentha Pulegium, Essential Oil of.** L. Tétay. (*Bull. Soc. Chim.*, **27**, 186.) The oil was fractionated under a pressure of 20 mm. and separated into two portions, a considerable quantity boiling below  $105^\circ\text{C}$ ., and a main fraction between  $110$ – $112^\circ\text{C}$ ., practically nothing distilling above that temperature. The first fraction contained menthone, and a mixture of terpenes which were not identified. The second fraction consisted mainly of pulegone, accompanied by menthol, and probably small amounts of  $\alpha$ - or  $\beta$ -isopulegone.

**Menthyl Chloromethylate.** E. Wedekind. (*Pharm. Zeit.*, **46**, 322.) The chloromethylic ester of menthol has been obtained by the action of formaldehyde on menthol in the presence of gaseous hydrochloric acid, according to the equation  $C_{10}H_{19}OH + CH_2O + HCl = C_{10}H_{19}OCH_2Cl + H_2O$ . It forms an oily colourless liquid, fuming slightly on exposure to the air, distilling between 160–162° C. at 16 mm. It is rapidly dissociated into menthol, formaldehyde and hydrochloric acid on contact with water. It has been successfully used as a spray for inhalation in the treatment of affections of the respiratory passages. It is claimed that the menthol and formaldehyde set free are alone volatilized, the hydrochloric acid remaining in the water.

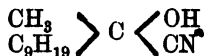
**Mercuric Oxide, Action of, on Metallic Salts.** A. Mailhe. (*Bull. Soc. Chim.* [3], **25**, 786.) The author does not agree with the statement of H. Rose, that HgO precipitates ZnO from solutions of  $ZnCl_2$ ; he finds that the white crystalline powder, composed of small hexagonal scales, is zinc oxychloride,  $ZnCl_2 \cdot 3ZnO \cdot 3H_2O$ . With solution of  $ZnBr_2$  the action is different, long clinorhombic, white prisms of the double salt  $HgBr_2 \cdot ZnO \cdot 8H_2O$  are slowly formed. With very concentrated solutions of  $ZnSO_4$ , mercuric oxide causes no change, but with concentrated solutions of  $Zn_2NO_3$  in the cold, small white micro-crystalline scales or needles are slowly formed, which have the composition  $(NO_3)_2Hg \cdot ZnO \cdot 2H_2O$ . It is easily decomposed by water with the liberation of HgO. In boiling solutions of  $Zn_2NO_3$ , mercuric oxide dissolves, and, on cooling, quadratic crystals having the composition  $(NO_3)_2Hg \cdot ZnO \cdot H_2O$  are deposited. Nickel chloride gives with HgO a complex oxychloride having the formula  $HgCl_2 \cdot NiCl_2 \cdot 7NiO \cdot 10H_2O$ . With cold concentrated nickel nitrate it slowly forms  $2(NO_3)_2Hg \cdot 3NiO \cdot 8H_2O$  in micro-lamellæ; hot solutions, on cooling, deposit larger green hexagonal lamellæ, having the formula  $(NO_3)_2Hg \cdot NiO \cdot 2H_2O$ . In a similar manner double salts of cobalt, manganese, copper, cadmium, lead, and iron, with mercuric oxide, were obtained and are described in full.

**Mercurous Nitrite.** P. C. Ray (*Chem. Centr.*, **72**, 90) obtains mercurous nitrite by the action of dilute  $HNO_3$ , sp. gr. 1.041, on excess of the metal. The mercury is placed in a tall beaker, containing the acid, in such quantity that it forms a ring or horseshoe layer on the bottom, and is left at ordinary temperatures. As fast as crystals form on the surface of the metal these are removed by means of a glass rod. To separate this crystalline

mass from globules of mercury and from mercurous nitrate, it is boiled in water, and the hot saturated solution filtered. On stirring this filtrate, mercurous nitrite,  $\text{Hg}_2(\text{NO}_2)_2$ , separates out as a fine granular crystalline powder. If 120 Gm. of this be digested on the water bath with 69 Gm. of ethyl iodide, a small quantity of ethyl nitrite distils over. If the residue be then further heated in oil bath, a mixture of ethyl nitrite and nitroethane is obtained. By treating mercurous nitrite with sodium chloride, calomel is precipitated and two oxychlorides separate out from the filtrate, on spontaneous evaporation, both having the formula  $2(\text{HgCl}_2 \cdot 2\text{HgO})\text{H}_2\text{O}$ , one orange yellow, the other black. The latter is converted into the yellow modification by treatment with  $\text{NaOH}$ .

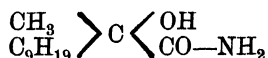
**Mercury Tannate, Preparation of.** Zdarek. (*Pharm. Zeit.*, through *Journ. Pharm. d'Anvers*, **58**, 98.) Commercial mercury tannate is found to be extremely variable in the amount of mercury combined. To obtain a product of fairly constant composition containing, as a mean, 55.7 per cent of Hg, the following process is recommended. Mercurous nitrate, freshly prepared, 20, is triturated with a few drops of water to a very fine powder. Tannin 12 and water 20 are then added, and the trituration continued for half an hour. This is important, for if the mixture be rubbed down for a shorter period, a basic product containing a much greater amount of mercury will be obtained. The insoluble product is then treated with a large volume of water, washed free from nitric acid by decantation, collected, pressed, and dried at about  $30^\circ\text{C}$ .

**Methyl-nonyl-ketone, Derivatives of.** H. Carotte. (*Comptes rend.*, **134**, 477) Methyl-nonyl-ketone does not directly combine with  $\text{HCN}$  either alone or in the presence of  $\text{HCl}$ . If, however, a few drops of  $\text{AmHO}$  be added to the mixture of the two bodies, combination takes place, which is at first energetic and then slow, forming a brown oily substance which, no longer reacts with alkaline bisulphites, and which, when purified by animal charcoal and solution in ether, forms a colourless oil which does not crystallize. This is the nitrite alcohol

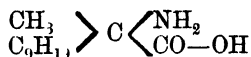


If this body be treated with a small quantity of  $\text{HCl}$  and heated for an hour on the water bath, then neutralized with  $\text{Na}_2\text{CO}_3$ , it forms a compound crystallizing on cooling. These crystals, purified

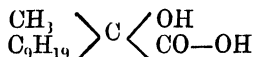
by recrystallization from alcohol 95 per cent, melt at 86–87°C. and have the constitution



When the nitrite alcohol is treated with a great excess of HCl for a prolonged period, an oily substance is formed, which crystallizes but slowly. It is soluble in alkalis and liberated from combination with them by acids. It is soluble in a small quantity of ether, but on addition of a larger volume of that solvent, deposits pearly crystals m.p. 185°, probably having the formula



The ethereal mother liquor gives, on spontaneous evaporation another crop of crystals



or methyl-nonyl-carbinol-carbonic acid. It forms small white crystals m.p. 46°C., and gives crystalline salts with alkalis.

**Monarda Fistulosa, Hydrothymoquinone in the Essential Oil of.** J. W. Brandel and E. Kremers (*Pharm. Review*, **19**, 241.) Hydrothymoquinone has been identified among the phenolic constituents of *Monarda* oil. It was identified by the formation of violet-coloured thymoquinhydrone with thymoquinone. It is considered probable that the colour of other phenol-containing oils may be due to an analogous reaction between these phenols and quinones present in the oil.

**Monosodic Orthophosphate, Acid.** H. Gilián (*Comptes rend.*, **134**, 711.) The white crystals which are found to effloresce on the surface of sticks of commercial metaphosphoric acid are proved not to be a peculiar form of pyrophosphoric acid, as stated by Zettnow, but to consist of a sodium salt  $\text{NaH}_5\text{P}_2\text{O}_8$ . The composition of the commercial sticks is found to agree with the formula  $\text{NaPO}_3 + \text{HPO}_3$ , which, with the addition of two molecules of water, gives the salt under notice, thus  $\text{NaPO}_3 + \text{HPO}_3 + 2\text{H}_2\text{O} = \text{NaH}_5\text{P}_2\text{O}_8$ .

**Morphine, Oxidation of, by the Juice of *Russula delica*.** J. Bougault. (*Comptes rend.*, **134**, 1361.) When an aqueous solution of morphine hydrochloride is exposed to the air, after being mixed with the juice of *Russula delica*, the mixture becomes turbid, and in 24 hours, small crystals commence to form. After three or four days, the separation of these crystals is complete, and

the supernatant liquid becomes clear again. These crystals are found to be oxymorphine (dehydromorphine) and are identical in every respect with oxymorphine obtained by oxidizing morphine with potassium ferricyanide in the presence of alkali. This oxidation of the alkaloid by a vegetable ferment points to the probability of its undergoing an analogous change when taken internally, due to the influence of the oxydases of the body. Oxymorphine is easily separated from morphine, on account of its relatively great insolubility, both as a free base and in the form of salts.

**Murexide, Formation of, in *Murex brandaris*.** R. Dubois. (*Comptes rend.*, 134, 245.) A. Letellier has shown (*Archiv de Zoolog. Exper.*, 1890, 262) that the purple dye of the colour gland of *Murex brandaris* is formed by the action of three bodies, one unaltered, the other two giving respectively a red or blue colour when exposed to the light. The author finds that when these fresh glands are bruised with sand in a mortar, in the dark, washed with absolute alcohol and filtered, the filtrate exposed to the light and again filtered, that pieces of paper moistened in the second filtrate no longer assume any colour when exposed to light, even when moistened with water. If, however, the magma of crushed glands be macerated with chloroform water in the dark, then mixed, without filtration, with glycerine, this extract also does not become coloured on exposure to light; but if a drop of this glycerine extract be allowed to come in contact with the paper moistened with some of the alcohol extract, a purple colour is obtained on exposure to the sun. If the alcoholic extract be previously heated to 120°C. in an autoclave no colour is produced. Microscopic examination of the glycerine extract shows the presence of numerous granular bodies, similar to the vacuoloids in the phosphorescent organs of certain insects. These may be removed by filtration through a fine medium, and the filtrate thus obtained ceases to give any colour with the alcoholic extract of the glands. The author proposes for this class of bodies the name of macro-zymases, and purpurase for this particular kind. The smaller ferments which cannot be eliminated by simple filtration he proposes to call microzymases.

**Mustard, Essential Oil of, Determination of.** — Roeser. (*Répertoire*, 14, 116.) The determination of allyl sulpho-cyanate in essential oils, or after distillation from solid mustard preparations, is thus conducted. A 1 per cent. solution of the oil in 95 per cent. alcohol is prepared, and to 5 c.c. of this, 10 c.c. of solution of

ammonia is added, the mixture diluted with water, 10 c.c. of N/10  $\text{AgNO}_3$  solution added and allowed to stand for 24 hours. The whole is then made up to 100 c.c. with distilled water, filtered, 50 c.c. of the filtrate taken and treated with 5 c.c. of N/10  $\text{KCN}$  solution, and the excess of  $\text{KCN}$  titrated back with N/10  $\text{AgNO}_3$ , a few drops of slightly ammoniacal solution of  $\text{KI}$  being used as an indicator. Double the number of c.c. of N/10  $\text{AgNO}_3$  thus used indicates the amount of silver nitrate used up in the 100 c.c. This figure multiplied by 0.3137 gives the amount of mustard oil present, based on the average of 30 per cent. for sulphurin mustard oil. To determine the amount of oil in powdered mustard, 5 Gm. is taken, macerated for two hours in a mixture of water 60 c.c., and alcohol, 60 per cent., 15 c.c., then distilled into a flask containing 10 c.c. of ammonia; to this 10 c.c. of N/10  $\text{AgNO}_3$  solution is added, the mixture is made up to 100 c.c., and the process continued as indicated above.

**Neroli Oil. Characters of Last Year's Product.** E. Theulier. (*Bull. Soc. Chim.*, **25**, 762.) The characters of a large number of samples of neroli oil distilled during the 1901 harvest have been tabulated. The sp. gr. ranged from 0.869 to 0.8726 with a mean of 0.870. The  $[\alpha]_D = + 2^\circ 50'$  to  $+ 7^\circ 20'$ , the mean  $+ 4^\circ 48'$  at  $23^\circ\text{C}$ . The linalyl acetate percentage ranged from 8.08 to 14.7, with an average of 11.27. The amount of methyl anthranilate varied between wide limits from 0.42 to 1.1 per cent., giving a mean of 0.7 on the 33 samples examined. The yield fluctuated from 0.91 to 1.33 per cent. Compare (*Year-Book*, **1901**, 87). J. Gras (*Schimmel's Report*, October, **1901**, 38) confirms the fact that the rotation of last year's neroli oil was higher than normal, ranging, with him, from  $+ 4^\circ 2'$  to  $+ 7^\circ$ . In 1899 it fluctuated from  $+ 3^\circ 22'$  to  $+ 5^\circ 24'$ , and in 1900 from  $+ 2^\circ$  to  $+ 5^\circ 40'$ .

**Neroli Oil, Chemistry of.** Albert Hesse and Otto Zeitschel. (*Journ. Prakt. Chem.*, **64**, 245-260, through *Chem. Centr.*, **72** [2], 930.) As in the case of jasmin flowers, the authors find that by extracting the water of distillation with ether a further considerable quantity of oil may be recovered. The residual flowers, after the *enfleurage* process, are also found to yield oil on distillation. The authors find that only about one-third of the total oil is recovered as neroli oil by steam distillation, and only the same amount by macerating the flowers in melted fat in the process of making the pomade. The residual flowers, after this fat extraction, still contain a considerable amount of oil.

*Enfleurage*, which is but little practised with orange flowers, only extracts  $\frac{1}{10}$  of the available oil.

The oil recovered by means of ether from the distillation water of neroli oil manufacture, has the sp. gr. 0.950; opt. rot.  $[\alpha]_D = +2.0$ ; saponification number 72, equivalent to 25.2 per cent. of esters calculated as linalyl acetate, and contains 19.4 per cent. of methyl anthranilate. Direct determination of the last constituent shows the presence of 16 per cent.

The oil extracted by volatile solvents from the fresh flowers had the sp. gr. 0.907; saponification number 55.2, and contained 7.6 per cent. of methyl anthranilate. The oil extracted from orange pomade had the sp. gr. 0.913; opt. rot.  $[\alpha]_D = -5^\circ$ ; saponification number 78.1, and contained 9.2 per cent. of methyl anthranilate. The oil of the residual flowers, after making the pomade by the maceration process, had the sp. gr. 0.882; opt. rot.  $[\alpha]_D = +3^\circ 40'$ ; saponification number 71.8, and contained only 0.35 per cent. of methyl anthranilate. The oil obtained by shaking out with ether the distillation water from these flowers had the sp. gr. 0.930; opt. rot.  $[\alpha]_D = +2^\circ 0'$ ; saponification number 42.0, and contained 8.85 per cent. of methyl anthranilate. The oil obtained by the *enfleurage* process had the sp. gr. 0.909; opt. rot.  $[\alpha]_D = +8^\circ 34'$ ; saponification number 58.2, and contained 5.2 per cent. of methyl anthranilate. The authors do not agree with the statement of Jeancard and Satie (*Year-Book*, 1901, 87) that the difference in odour between neroli oil and extracted orange flower oil is due to saponification of the esters. They find by direct experiment that methyl anthranilate is quite constant, and that by mere distillation only about 1.8 per cent. of linalyl acetate is lost when working with the pure ester. Prolonged heating causes a greater amount of saponification; but in the process of distilling the flowers, this cannot be sufficient to account for the difference in the odour, which is attributed to the solubility of a portion of the oil in the distillation water. They find that when the dissolved portion is recovered and added to the water-insoluble oil, that the odour of the mixture is identical with that of the oils obtained by extraction and maceration, provided that all the oil is extracted from the residues, and bulked, in each case. *Enfleurage* oil, however, does differ, and the properties of the products of this process are distinct, both in the case of orange and jasmin.

The constitution of the ether recovered oil from the water distillate of orange flowers is being investigated. Geraniol, phenylethyl alcohol, and phenyl-acetic-ester have been detected in the

oil. Although the amount of methyl anthranilate in this oil, 16 per cent., is remarkable, it is not, alone, sufficient to account for the difference in odour; this must be attributed to other constituents.

**Neroli and Petitgrain Oil.** Jeancard and Satie. (*Bull. Soc. Chim.*, **25**, 934.) As last year (*Year-Book*, **1901**, 87), a report is given of the characters of latest crop of neroli and petitgrain oils. For last season's neroli the sp. gr. at 27°C. lay between 0.866 and 0.8684  $[\alpha]_D = + 5^\circ$  to  $+ 1^\circ 50'$ ; saponification number, 30.1 to 53.2; solubility in alcohol 80 per cent. at 25°C. 1:1.5 to 1:1.8. For petitgrain oil of the last harvest the following constants were obtained:—sp. gr. at 26°C., 0.882 to 0.883  $[\alpha]_D = - 4^\circ 50'$  to  $- 5^\circ$  solubility in 70 per cent. alcohol 1:3; saponification number, 150.5 to 158.9. Petitgrain oil of last year had a slightly lower sp. gr. than the crop reported on in the previous year.

**Neroli Oil from Sweet Orange Flowers.** E. Theulier. (*Bull. Soc. Chim.*, **27**, 278.) The oil obtained from sweet orange flowers differs in odour from true neroli of bitter orange flowers. Its sp. gr. at 23°C. is 0.860;  $[\alpha]_D = + 29^\circ 30'$ ; esters, calculated as linalyl acetate, 6.35 per cent. It does not dissolve in alcohol 90 per cent. It deposits crystals when cooled; these melt at 55°C. It contains dextro-camphene, dextro-limonene, and dextro-linalol.

**Niobium.** H. Moissan. (*Comptes rend.*, **133**, 20.) Niobite, in powder, is reduced in the electric furnace with sugar charcoal by means of a current of 1,000 ampères and 80 volts. In this manner an amalgam of niobium and titanium is obtained, all the manganese and most of the silica present in the mineral being volatilized. The alloy is reduced to powder, and dissolved in hydrofluoric acid with a little nitric acid, the solution filtered and treated with potassium hydrofluoride, which combines with the niobium to form potassium fluoxyniobate and potassium fluotantalate. The latter salt, being insoluble in water, is filtered out, when the mixed salts are treated with that solvent, as has been shown by Marignac. The trace of iron which is present is precipitated by means of ammonium sulphhydrate. The potassium fluoxyniobate is purified by repeated recrystallization and then converted into niobic acid. This acid is then mixed with 18 per cent. of sugar charcoal, moistened with oil of turpentine and compressed into small cylinders, which are slowly calcined in a Perrot furnace. These cylinders are then introduced into the electric furnace, when violent reaction takes place, the niobic acid being



reduced to the metallic state. Niobium thus obtained forms a hard metallic mass which scratches quartz. It melts above  $1,800^{\circ}\text{C}$ . It unites with fluorine, with incandescence, when gently heated, forming a volatile fluoride. It is attacked by chlorine above  $205^{\circ}\text{C}$ ., forming  $\text{NbCl}_5$  of a golden yellow colour. Bromine attacks it at a slightly higher temperature, giving a white bromide.

Iodine is without action at the temperature of the fusion of glass. It ignites in oxygen at about  $400^{\circ}\text{C}$ ., and at a higher temperature in air; sulphur has only a superficial action at  $600^{\circ}\text{C}$ ., tellurium and selenium none at all. In nitrogen at  $1,200^{\circ}\text{C}$ . it forms a nitride, each particle of the metal becoming coated with a layer, of this compound, of various depths, which has a fine orange colour. Below  $600^{\circ}\text{C}$ . N, P, As, and Sb are without action in Nb. When fused, Nb slowly absorbs C. When niobic acid is heated with excess of C, the product does not contain uncombined graphite. Nb alloys with difficulty with metals. Gaseous HCl attacks it below at red heat, evolving H, and forming a volatile yellowish-white chloride.  $\text{NH}_3$  is completely dissociated into N and H on passing over Nb, in fine powder, heated to redness, while the metal does not change in weight.  $\text{SO}_2$  is reduced at about  $600^{\circ}\text{C}$ ., as are  $\text{N}_2\text{O}$ , NO,  $\text{P}_2\text{O}_5$ , and  $\text{CO}_2$ , and most other reducible bodies; niobium is, in fact, a very powerful reducing agent. Hydrofluoric acid attacks it slowly, but nitric and hydrochloric acid in aqueous solution are inactive. Sulphuric acid does not combine with niobium in the cold; on heating, the acid becomes brown in colour and throws down niobic acid. In general characters niobium appears to be allied to boron and silicon, and to belong to the metalloid group of elements.

**Nitrates, Brucine Test for.** P. Cazeneuve and H. Défournel (*Bull. Soc. Chim.*, **25**, 639) substitute glacial formic acid for sulphuric acid in applying the well-known brucine colour-reaction for the detection of nitrates. Formic acid has the advantage that it gives no colour whatever with brucine. When examining drinking water, a litre is evaporated in the usual manner, the residue taken up with a little water, and evaporated after the addition of a little brucine, in a flat-bottomed capsule. A few drops of glacial formic acid are then allowed to fall on the residue while still warm. A yellow tint is obtained with even 1:100,000, which turns to a rose colour in 12 hours, or in 15 minutes on adding  $\text{H}_2\text{O}_2$ .

**Ononin.** F. V. Hemmelmayr. (*Monats. für Chem.*, **23**, 133.) This glucoside is obtained in the crude state by treating

the portion of the alcoholic extract of the root of *Ononis* (*arvensis*?), which is insoluble in water, with PbO in the presence of alcohol. After prolonged standing, crude ononin crystallizes out, and is purified by recrystallization from alcohol. The first crop of crystals consists of *ononin* and *onon*; the former, being soluble in hot water, is removed by its means. *Onon*, purified by recrystallization from hot water, and finally precipitating its aqueous solution with pyridine, has the formula  $C_{29}H_{32}O_{12}$ ; it forms fine micro-needles m.p.  $270^{\circ}C.$ , and is hydrolyzed by boiling with  $H_2SO_4$ . Baryta has no action on it. *Ononin*  $C_{25}H_{26}O_{11}$  purified by repeated crystallization from water, forms colourless needles which frit at  $204^{\circ}C.$ , and melt at  $210^{\circ}C.$  Baryta converts it ultimately into *ononetin*,  $C_{18}H_{16}O_5$ , but if only boiled for a short time with baryta water, onospin  $C_{24}H_{26}O_{10}$ . Ononin is converted into form-ononetin  $C_{18}H_9O(O\cdot CHO)(OH)(OCH_3)$  by dilute  $H_2SO_4$ ; this is converted into formic acid and ononetin by  $Ba_2HO$ . The second crop of crystals of crude ononin from alcohol consists\* of chiefly  $\psi$ -*oninon*; it is a white crystalline mass melting at  $206$ – $210^{\circ}C.$  It is converted slowly by water, more rapidly by  $Ba_2HO$  into  $\psi$ -onospin  $C_{24}H_{24}O_{11}$ , which occurs in two isomeric forms, one melting at  $195$ – $197^{\circ}C.$ , the other at  $220$ – $221^{\circ}C.$  The third crop of crystals consists of a mixture of several bodies, which have not yet been isolated.

**Organic Matter, Destruction of, in Toxicological Analysis.** G. Denigès. (*Journ. Pharm. Chim.* [6], **14**, 241.) 200 Gm. of the substance, placed in a capacious (2-litre) capsule is treated with 200 c.c. of  $HNO_3$ , sp. gr. 1.39, and 5 c.c. of  $KMnO_4$  solution, 2 per cent., and the mixture is heated over a large Bunsen burner, stirring, if necessary. When violent action is succeeded by tranquil boiling, the mixture is transferred to a smaller capsule, the vessel first used being washed out with 100 c.c. of  $HNO_3$  and then with a similar quantity of tepid water. The washings are added to the rest of the mixture. The capsule is now covered with an inverted short-beaked funnel and gently boiled for 4 or 5 hours, care being taken that evaporation is not carried so far that the liquid blackens. The heating is stopped when there is about 70 to 80 c.c. of residue left. If blackening of the mixture threatens, more  $HNO_3$  must be added. When the volume of liquid is not more than 70–80 c.c., 100 c.c. of pure sulphuric acid is quickly introduced in a thin stream, when ruddy fumes are given off and the mass becomes brown. Nitric acid is again added in 4 or 5 successive quantities, each of 5 c.c., by means of a pipette, being

delivered in a thin stream into the centre of the mass. The mixture is then heated strongly for 5 or 6 minutes, the flame withdrawn, and three more lots of nitric acid are added. The basin is then again covered with the funnel, and the whole again boiled. Then more nitric acid is added drop by drop, by means of a small funnel with a capillary tube which passes down the beak of the larger covering funnel, until finally the tint of the liquid passes from orange to bright yellow. The excess of acid is then evaporated so as to leave a residue of not more than 10 or 15 c.c., a further addition of 50 or 60 drops of nitric acid being made during this evaporation. The residue is cooled, diluted with water to 100 c.c., boiled to drive off nitrous fumes, and again adjusted to 100 c.c. Any antimony or arsenic present in the original substance will now be found in this aqueous solution perfectly free from organic matter.

**Orthophosphoric Acid and its Alkyl Esters, Combination of with Aromatic Aldehydes and Esters.** P. N. Raikow and P. Schtarbanow. (*Chem. Zeit.*, **24**, 367, through *Chem. Centr.*, **73**, 311.) The authors have endeavoured to determine if the regularity of the stereochemical nature, which Klages has shown to exist in the ketonphosphoric acid compounds, exists in the aldehyde compounds, also how far the insignificant differences which exist in structure and composition between aldehydes, esters, and ketones, show corresponding differences in their purification by means of phosphoric acid. Aliphatic aldehydes and esters, esters of aromatic acids whose alkyl radicles are greater than their methyl groups, and also most of the methyl esters do not react with phosphoric acid. Crystalline phosphoric acid compounds are formed by benzaldehyde, *p*-tolylaldehyde, anisaldehyde, vanillin, methyl benzoate, and *p*-dimethylphthalate. *p*-Tolylaldehyde in addition forms a compound with monomethylphosphoric acid, but the other compounds mentioned above do not.

**Oxygen, Pure, New Source of.** George F. Jaubert. (*Comptes rend.*, **134**, 778.) Compressed tablets of sodium peroxide, or of sodium potassium peroxide,  $\text{NaKO}_2$ , have been introduced for the commercial production of oxygen by means of contact with cold water. In order to effect the evolution of the greater part of the available oxygen without the application of heat, the peroxides, before undergoing compression, are mixed with the theoretical amount of a permanganate or hypochlorite, or with a trace of a salt of nickel or copper, which ensures the decomposition of the hydrated alkaline peroxide, which, under ordinary circumstances,

is stable at normal temperatures, and requires to be heated to complete its decomposition. The gas evolved is of remarkable purity, consisting of 99.9 per cent. of oxygen. It is claimed that in this solid form, the transport of available oxygen is both more convenient and safe, while the ease with which the gas is liberated by mere contact with cold water will render its application to industrial processes both convenient and economical.

**Pepper Adulterants.** A. Mennechet. (*Journ. Pharm. Chim.* [6], 14, 587.) The presence of fruits of *Embelia ribes*, or of *Myrsine africana*, both of which are frequently used as adulterants of pepper, may be readily detected by treating the ethereal extract of the powdered fruits with water and a little solution of ammonia. On shaking, a deep violet-red colour is obtained in the aqueous layer if either of these adulterants be present. Pure pepper does not give this reaction.

**Peppermint Plants, Influence of Sodium Chloride on the Growth of.** E. Charabot and A. Hébert. (*Comptes rend.*, 134, 181.) Continuing their researches on the influence of the vegetative growth of plants on the production and quality of volatile oils (see *Year-Book*, 1901, 66), the authors find that the presence of sodium chloride in the dressings applied to growing crops of peppermint increases the amount of organic matter in the plants, lessens the amount of water in the plant tissues, increases the amount of esters formed, and prevents the transformation of menthol into menthone. Experiments conducted with plots of mint, grown side by side, some cultivated under ordinary conditions, the others watered once, in May, with a solution of NaCl, 500 Gm., in 20 litres of water, showed a marked favourable influence on the quantity of menthyl esters produced by the salted plants; the oil distilled in August from the green parts containing respectively 33.3 per cent. of esters in the one case and 39.6 per cent. in the other, an increase of 6.3 per cent. in favour of the plants treated with NaCl. The application of salt, however, so far arrests the growth of the plant that the total quantity of ester per hectare produced is less in the case of the salt-treated plants than from those of normal growth.

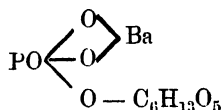
**Phellandrene Nitrite.** Oswald Schreiner. (*Chem. Centr.*, 72, 544.) The crystalline mass obtained by treating phellandrene-containing oils with sodium nitrite and acetic acid is not always one substance. By recrystallizing from cold methyl alcohol the solid nitrosite thus obtained from a eucalyptus oil, two crystalline nitrosites were separated. One of these melted at

120–121°C. and had the rotation, in chloroformic solution, of  $[\alpha]_D = +123.5$ , the other, crystallizing in brilliant needles, melted at 105–106°C. and had the  $[\alpha]_D = -36^\circ$ .

**Phenol, The Red Colouration of.** F. G. Gordon. (*Merck's Report*, 11, 195, through *Pharm. Journ.*) The red colouration of phenol is attributed to the action of ozone, or of hydrogen peroxide, on traces of iron derived from the glass of bottles in which the phenol is stored. Phenol free from iron was found to have acquired a marked red colour, and to give distinct reactions for that metal after being stored in green glass bottles for six months. If kept in similar bottles, previously coated internally with hard paraffin, it remained white, but the same acid, kept in an uncoated and uncorked bottle, acquired a light-red colour. In bottles of iron-free glass it became red on the addition of a trace of ferrous sulphate in a few days, or in a few hours if a little hydrogen peroxide were added. With hydrogen peroxide alone, iron-free acid in a paraffin-coated bottle remained white, but turned red in ten days after the addition of a fragment of iron wire. Exposure to light appears to bleach reddened crystals, and by melting and recrystallizing, a fairly white crop of crystals may be obtained by separating those which first form on cooling.

**Phosphomannitic Acid and its Salts.** L. Portes and G. Prunier. (*Journ. Pharm. Chim.* [6], 15, 457.) Mannite 546 Gm., previously dissolved in boiling water 500 c.c. is heated in a capacious flask with phosphoric acid (sp. gr. 1.75) 475 Gm., on the steam bath for seven days at 120–125°C., the mixture being agitated three or four times daily. The mass is then cooled, and dissolved in cold water. The solution thus obtained is precipitated with basic lead acetate until a distinctly alkaline reaction with litmus is obtained. The precipitate is collected, washed free from mannite and acetate, and then suspended in water, and decomposed with a current of  $H_2S$ . The  $PbS$  is filtered out and the filtrate freed from  $H_2S$  with a current of air. It is then treated with a large excess of recently-precipitated  $BaCO_3$ . When no more  $CO_2$  is evolved,  $Ba2HO$  is added until a slight alkaline reaction is obtained with phenolphthalein. The phosphoric acid is thus completely precipitated while the phosphomannitic acid remains in solution as the soluble barium salt. The phosphate is removed by filtration and the phosphomannitic acid liberated with dilute sulphuric acid. Since it is not yet quite pure, it is again treated with  $BaCO_3$ , filtered and the pure barium phosphomannitate precipitated with 3 or 4 volumes of alcohol 90 per cent.

The flocculent precipitate thus formed is collected, washed with alcohol, 60 per cent., and dried at 45–50°C. It has the formula



Being readily soluble in water, phosphomannitic acid may be obtained by treating it, in aqueous solution, with an equivalent of dilute sulphuric acid. Its salts may be obtained by double decomposition with soluble sulphates. Of these, magnesium phosphomannitate alone has been obtained in a crystalline condition. The free acid itself is **amorphous**, forming a colourless very hygroscopic gummy mass which invariably contains a little  $\text{H}_3\text{PO}_4$ , formed during evaporation. It is a dibasic acid, forming neutral and acid salts.

**Phosphorus. Toxicological Detection of.** P. E. Alessandri. (*Chem. Centr.*, **73**, 831.) Binda has recommended rubbing down a small portion of the material with a glass rod and then placing it on a warm glass plate in the dark. The characteristic phosphorescence is then easily observed. Another method consists of distilling an alcoholic or carbon disulphide solution of the material into nitro-molybdic acid, or silver nitrate solution, and examining the precipitate under the microscope. A third confirmatory test is obtained by evaporating a portion of the carbon disulphide solution and burning the residue. A green flame is indicative of the presence of phosphorus.

**Picea Vulgaris from Kronstadt, Constituents of the Oleo-resin of.** A. Tschirch and M. Koch. (*Archiv der Pharm.*, **240**, 272.) This variety of picea resin has been investigated by the authors' method of shaking out ethereal solutions with successive alkaline solvents (compare *Year-Book*, **1901**, 100). It is found to consist of picipimaric acid  $\text{C}_{12}\text{H}_{20}\text{O}_2$  3 per cent., soluble in ammonium carbonate solution. Picea-pimaric acid  $\text{C}_{20}\text{H}_{30}\text{O}_2$  2 per cent.,  $\alpha$ - and  $\beta$ -picipimarolic acid  $\text{C}_{18}\text{H}_{28}\text{O}_2$  47 per cent., all soluble in sodium carbonate solution. Essential oil 30 per cent. and resene  $\text{C}_{19}\text{H}_{30}\text{O}$  15 per cent., both of which are insoluble in caustic soda solution. Picipimaric is amorphous; picea-pimaric acid is crystalline;  $\alpha$ - and  $\beta$ -picipimarolic acid are separable by means of their lead salts. Both are amorphous. The essential oil boils between 175–180° and has the sp. gr. 0.870. When recently distilled it has a neutral reaction, but becomes acid on exposure to the air. Since the above results do not accord with those obtained

by Tschirch and Bruening with another specimen of *Picea* resin (*loc. cit.*), they conclude that the resins are derived from different botanical species of *Picea*.

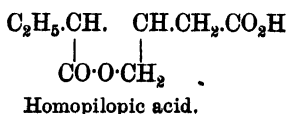
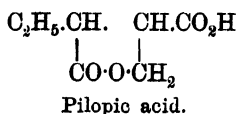
**Pilocarpine, the Constitution of.** H. A. D. Jowett. (*Proc. Chem. Soc.*, 17, 241.) The acids produced in the oxidation of isopilocarpine with permanganate have been further studied. The main product of the oxidation is a mixture of pilopic and homopilopic acids, but small quantities of acetic and propionic acids are formed at the same time.

*Pilopic Acid*,  $C_7H_{10}O_4$ , is a crystalline, monobasic, lactonic acid forming silky plates melting at  $104^\circ$ . The methyl and ethyl esters are oily liquids of a high boiling point, whilst the anilide, the strychnine salt, and the diamide of the corresponding hydroxy-acid are crystalline. The lactonic nature of the acid was proved by the preparation and analysis of the diamide, barium and silver salts of the corresponding hydroxy-dibasic acid.

*Homopilopic Acid*,  $C_8H_{12}O_4$ , is very similar in all its properties to pilopic acid, but has not been crystallized. Various derivatives of this acid were prepared and described.

The piluvic acid of Pinner and Kohlhammer,  $C_8H_{12}O_5$ , is probably a mixture of homopilopic with a little pilopic acid. [In a more recent paper Pinner and Schwarz abandon the name piluvic acid and propose for the acid the name homopilomalic acid, and the formula  $C_8H_{14}O_5$ ; it would therefore be isomeric with the hydroxy-dibasic acid derived from homopilopic acid.] Pilopic acid, on fusion with caustic potash at a high temperature, yielded normal butyric acid; when fused at a low temperature the greater part of the acid was recovered unchanged, though a small quantity of an isomeric dibasic unsaturated acid was obtained. This acid melted at  $190^\circ C.$  and was not identical with any acid of this formula previously described.

Homopilopic acid, when fused with caustic potash at a moderate temperature, yielded  $\alpha$ -ethyltricarballic acid,  $C_2H_5.CH(CO_2H).CH(CO_2H).CH_2.CO_2H$ , which was fully identified by the preparation of certain characteristic derivatives. From a consideration of these facts the following constitutional formula for pilopic and homopilopic acids were proposed:—



**Pilocarpine.** A. Pinner and R. Schwarz. (*Berichte*, **35**, 192) find that the mixture of two lactones obtained by Jowett (*Journ. Chem. Soc.*, **79**, 1331) take up water forming the acids  $C_8H_{14}O_5$  and  $C_7H_{12}O_5$ ; they are therefore identical with the acids obtained by Pinner and Kohlhammer (*Year-Book*, **1901**, 101). These latter investigators assigned to them the formulæ  $C_8H_{12}O_5$  and  $C_7H_{10}O_5$ , which are consequently incorrect. In other respects the authors' research confirms previous work and also that of Jowett on isopilocarpine. They consider a change in the nomenclature necessary; both of the above acids possess a similar structure to malic acid, so the acid  $C_7H_{12}O_5$ , designated isohydrochelidonic acid by Pinner and Kohlhammer, is re-named pilomalic acid, and the acid  $C_8H_{14}O_5$ , termed piluvic acid by Pinner and Kohlhammer, is re-named homopilomalic acid. The lacto-acids of Jowett are known as pilopic and homopilopic acids respectively. The authors have prepared isopilocarpine by heating pilocarpine to  $210-220^\circ$  for half to one hour. By treatment with KOH or NaOH it forms the potassium salt of an acid  $C_{11}H_{18}O_3N_2$ —isopilocarpinic acid. By treatment with potassium carbonate, isopilocarpine gives the potassium salt of pilocarpinic acid, from which the free acid cannot be obtained. Instead, pilocarpine is obtained, by splitting off of  $CO_2$ . The authors confirm the formula for the dibrom-iso-pilocarpine-perbromide obtained by Jowett. From the behaviour of pilocarpine towards bromine they consider that it does not contain a double linking between two carbon atoms, but probably, between a carbon and a nitrogen atom. By action of bromine water on pilocarpine, bromocarpinic acid is produced,  $C_{10}H_{15}O_4N_2Br$  and by action of bromine and water on iso-pilocarpine, dibromo-iso-pilocarpinic acid results  $C_{11}H_{14}O_4N_2Br_2$ . Since this compound contains one more carbon atom than the corresponding compound prepared from pilocarpine, it appears probable that in pilocarpine there is an exposed carbon atom.

Pinner and Kohlhammer, by oxidation of pilocarpine with chromic acid, obtained an acid  $C_{11}H_{16}O_5N_2$  which they termed pilocarpic acid. Jowett, who oxidized isopilocarpine, suggested that this acid was only a mixture of pilocarpine and fatty acids. The authors repudiate this suggestion and have repeated the experiments. They find that isopilocarpine on oxidation gives, beside  $CO_2$ , a liquid smelling of fatty acids and which could not be further worked up. On the contrary, pilocarpine gives an acid having the composition  $C_{11}H_{16}O_5N_2$ , which corresponds to the acid obtained by Pinner and Kohlhammer.



The authors have found among the oxidation products of pilocarpine, a substance which is probably methyl urea  $\text{CO} \begin{matrix} \text{NH}_2 \\ \text{NHCH}_3 \end{matrix}$ .

If this is so, it is probable that it will throw considerable light upon the constitution of pilocarpine. Lastly, the authors have succeeded in obtaining pilocarpine in crystals, melting at  $34^\circ\text{C}$ .

**Piscidia Erythrina, Constituents of.** P. C. Freer and A. M. Clover. (*Journ. Amer. Chem. Soc.*, **25**, 390.) The piscidin, previously isolated from the bark of the Jamaica dogwood, is found not to be a simple body, but to consist of a mixture of two crystalline substances, one melting at  $216^\circ\text{C}$ , the other, which comprises about 20 per cent. of the so-called piscidin, at  $201^\circ\text{C}$ . The aqueous extract contains piscidinic acid, which occurs in the bark as a soluble lime salt. This, when liberated from the lead salt, has the formula  $\text{C}_{11}\text{H}_{12}\text{O}_7$ . It separates in glutinous masses from aqueous solution, but crystallizes from chloroform, ether, or from methylpropyl-ketone, in crystals melting at  $182\text{--}185^\circ\text{C}$ . It is dibasic, and resembles mucic or saccharic acid in its properties. It forms the mono-ethyl ester  $\text{C}_{11}\text{H}_{11}\text{O}_6 \cdot \text{C}_2\text{H}_5\text{O}$ , which occurs in glittering needles, melting at  $207\text{--}208^\circ\text{C}$ . Its neutral solutions are not precipitated by copper or barium, but the silver salt is a white insoluble precipitate. It gives no evidence of containing methoxyl groups by Zeisel's method, nor is it methylated, nor acted on by hydrobromic acid, nor does it give any derivatives of the aromatic series. It gives a dibromo-additive compound, probably  $\text{C}_{11}\text{H}_{12}\text{O}_7\text{Br}_2$ , in bright colourless needles, melting at  $234\text{--}236^\circ\text{C}$ . The chloroformic extract of the bark gives three crystalline bodies; a substance occurring in colourless needles, melting at  $150\text{--}155^\circ\text{C}$ ., and having the empirical formula  $\text{C}_{20}\text{H}_{22}\text{O}_7$ ; a body separating in large colourless prisms melting at  $201^\circ\text{C}$ ., having the formula  $\text{C}_{21}\text{H}_{26}\text{O}_5(\text{OCH}_3)_2$ , and a third body separating in yellow needles, melting at  $216^\circ\text{C}$ ., having the constitution  $\text{C}_{20}\text{H}_{13}\text{O}_1(\text{OCH}_3)_2$ . The so-called piscidin of previous workers is probably a mixture of these last two substances. After separating the above, a glucosidal body, which melts at  $50\text{--}80^\circ\text{C}$ ., is precipitated from the mother liquor by the addition of petroleum ether. On hydrolysis, this yields a crystalline body, melting at  $216^\circ\text{C}$ ., and the solution reduces Fehling's reagent. Petroleum ether extracts from the bark, as well as the two above-mentioned crystalline bodies, a third substance, which, recrystallized from alcohol, melts at  $159^\circ\text{C}$ ., and occurs in colourless monoclinic prisms.

**Platinum Group, Detection of the Metals of the.** H. Ledié and E. Quenessen. (*Bull. Soc. Chim.*, **27**, 179.) Advantage is taken of the different behaviour of the various metals of the platinum group with  $\text{Na}_2\text{O}_2$  to effect, by its means, a separation and detection of the members. The metal, in the form of a reduction precipitate, or in fine filings, is mixed with five or six times its weight of  $\text{Na}_2\text{O}_2$  and gently heated in a nickel crucible, the mixture being well stirred until a semi-fluid consistence is reached. The mass is then allowed to cool, the crucible placed in a larger evaporating dish, covered with a funnel to prevent loss, and water added equal in amount to 10 or 12 times the quantity of  $\text{Na}_2\text{O}_2$  used. After standing, the whole is transferred to a tall narrow precipitating glass, the insoluble portion allowed to subside, the supernatant liquid decanted, and the residue washed with water and filtered. *Osmium* is converted into sodium osmate, which forms a yellow solution; on passing a current of Cl through the warm solution osmic peroxide is volatilized and may be collected in ice-cold water in a suitable receiver, and identified by the formation of potassium osmate when treated with potassium nitrite, or with alcohol and potassium chloride. *Ruthenium* forms sodium peruthenate, which gives an orange-red solution with water. Distilled, as above, with chlorine, ruthenium peroxide is obtained, which is reduced on treatment with KCl and alcohol, the metal being precipitated. *Palladium* gives a yellow solution of sodium palladate. Nothing is volatilized by distillation in a current of chlorine, but the residue, neutralized with HCl and evaporated with KCl and a little  $\text{HNO}_3$ , gives a crop of ruby-red crystals of potassium chloropalladate, insoluble in a saturated solution of KCl. *Iridium* forms a blue solution of basic sodium iridate,  $4\text{Na}_2\text{O} \cdot \text{IrO}_3$ . This, when treated as described for palladium, gives black crystals of potassium chloroiridate. *Platinum* forms sodium-platinate, which is insoluble, and is left on the filter with nickel oxide. This residue is dissolved in hot strong HCl, filtered, excess of acid boiled off,  $\text{NaNO}_2$  added, then  $\text{Na}_2\text{CO}_3$ , to neutralize; the solution is then boiled and filtered. The filtrate, acidulated with HCl, is evaporated to dryness; the residue, dissolved in water, gives the characteristic Pt. precipitate with  $\text{AmCl}$  or KCl.

Rhodium is also precipitated as dioxide and sesquioxide. The first is soluble in HCl; its presence is indicated when the precipitate is treated, as described above, by the formation of a rose colour, due to  $6\text{NaCl} \cdot \text{Rh}_2\text{Cl}_6$ , when the excess of  $\text{Na}_2\text{CO}_3$  is neutralized with HCl.

**Polygonum Persicaria, Essential Oil of.** P. Horst (*Chem. Zeit.* **25**, 1055) has obtained 0.053 per cent. of volatile oil from the plant. It contains a crystalline camphor-like body, persicariol, a mixture of volatile fatty acids, among which acetic and butyric acid were recognized, and a liquid portion which has not yet been identified. In addition to these a tannin, wax, pectin, and traces of a body with an amine-like odour were detected.

**Pomegranate Bark, Alkaloidal Assay of.** W. Stöcker. (*Pharm. Zeit.*, **46**, 451.) 20 Gm. of the dry powdered bark is shaken repeatedly for twelve hours with a mixture of chloroform, 100 c.c., and solution of ammonia, 5 c.c. At the end of that time 20 c.c. of water, or as much as will cause the powder to ball together on vigorous agitation, is added. The mixture is then allowed to settle, 75 c.c. is filtered off, and the filter washed free from alkaloid with chloroform. Two-thirds of the chloroform is then distilled off, the residue transferred to a separator, and, after rinsing out the distilling flask with two successive portions of acid, shaken out with 10 c.c. of N/10 HCl solution. The aqueous layer is then filtered through the same filter as used before, three drops of hæmatoxylin solution added, and the excess of acid titrated back with N/10 alkali. The average molecular weight of the alkaloids is 147.5. European bark, both from stem and root, yields 0.4 to 0.5 per cent. of alkaloids; from Indian root bark, however, as much as 1.8 to 2.0 per cent. is obtained. The extract of the European bark contains 1.25 to 1.5 per cent. of alkaloids, while that of the Indian root bark gives 4.0 to 4.5 per cent.

**Potassium Cyanide, Commercial, Determination of Cyanate in.** O. Hertig. (*Zeit. für angew. Chem.*, through *Moniteur scientif.* [4], **16**, 122.) The method depends on the conversion of the cyanate present into an ammonium salt by the action of sulphuric or hydrochloric acids according to the equations:— $\text{KOCN} + 2\text{HCl} + \text{H}_2\text{O} = \text{KCl} + \text{NH}_4\text{Cl} + \text{CO}_2$  and  $2\text{KOCN} + 2\text{H}_2\text{SO}_4 + 2\text{H}_2\text{O} = \text{K}_2\text{SO}_4 + (\text{NH}_4)_2\text{SO}_4 + 2\text{CO}_2$ .

From 0.2 to 0.5 Gm. of the commercial cyanide is taken, dissolved in a few c.c. of water, acidulated with excess of dilute HCl or  $\text{H}_2\text{SO}_4$ , evaporated to dryness on the water bath, and redissolved in water. The ammonia is determined in the solution in the usual way—by decomposing with caustic soda solution and distilling into a known volume of 1/5N  $\text{H}_2\text{SO}_4$ , the excess of acid being then determined against 1/5N  $\text{NH}_4\text{HO}$ , using fluorescein as the indicator.

**Potassium, Detection of.** C. Reinhold (*Pharm. Zeit.*, **46**, 618) recommends the use of sodium picrate to precipitate potassium from a mixture of alkalis, since that potassium salt is relatively insoluble in water (1:260). Ammonium must first be removed in the usual way, since its picrate is also very insoluble. The limit of the reaction is about 0.5 per cent. of potassium. Cæsium and rubidium are also precipitated as picrates, which are even less soluble than potassium picrate, but as these are but rarely present, the fact need not interfere in ordinary analysis. If sodium be present as carbonate, it must first be converted into the chloride by the addition of HCl before applying the picrate test.

**Potassium Hydride.** H. Moissan. (*Comptes rend.*, **134**, 18.) Potassium hydride, KH, is best obtained by cautiously heating metallic potassium in threads with an atmosphere of hydrogen, in a tube, the lower part of which is exposed to a temperature of 360°C. In this manner a sublimate of felted white crystals of KH is obtained in the cooler part of the tube. Potassium hydride is one of the most easily decomposed compounds. It immediately combines with atmospheric moisture, liberating hydrogen and forming KHO. It decomposes in water without incandescence, hissing like a hot iron, and evolving hydrogen violently. It is dissociated, *in vacuo*, below a red heat, into hydrogen and potassium. It ignites in fluorine, in chlorine, and in dry oxygen, and possesses a powerful reducing action.

**Protopine in Papaveraceæ.** E. Schmidt. (*Archiv.*, **239**, 401.) Protopine,  $C_{20}H_{19}NO_5$ , is considered to be one of the most widely distributed alkaloids in the natural order Papaveraceæ. It has been isolated from *Chelidonium majus*, *Stylophorum diphyllum*, *Sanguinaria canadensis*, *Eschscholtzia californica*, *Glaucium luteum*, *G. corniculatum*, *Papaver somniferum*, *Argemone mexicana*, *Macleya cordata*, and *Bocconia frutescens*. It has also been found in the nearly allied orders, in *Fumaria officinalis*, by H. P. Trowbridge, who has shown the identity of the so-called fumarine with protopine; it also occurs in *Adlumia cirrhosa* and in *Corydalis cava*, as well as, probably, in *Petrocapnos*, *Platycapnos*, *Sarcocapnos*, *Ceratocapnos* and *Dielytra*. In these last-named plants it has been described as fumarine, and in *Argemone* as argemonine.

**Pumpkin Seed Oil.** W. Graham. (*Amer. Journ. Pharm.*, **73**, 352.) Pumpkin seed oil extracted from the crushed seeds by acetone has the following characters:—Sp. gr. at 15°C., 0.9208;

saponification number, 192.5; acid number, 18.9; ester number, 173.6; soluble in all proportions in ether, carbon disulphide or chloroform, and in 20 parts of absolute alcohol; drying on standing to a tough, yellowish, transparent mass. The yield of oil is 25 per cent.; it is a reddish, limpid liquid, with an agreeable odour and taste. An attempt to obtain the oil from the seeds by pressure was unsuccessful.

**Purginic Acid.** N. Kromer. (*Archiv.*, **239**, 389.) Hoehnel has stated (*Year-Book*, **1897**, 130) that on treating convolvulin with alkalis, in addition to convolvulinic acid and methyl-ethyl-acetic acid, another acid is formed, which is soluble in ether. This, when hydrolyzed, was found to split up into a hexose, decylenic acid,  $C_{10}H_{18}O_2$ , and oxylaurinic acid,  $C_{11}H_{22}.OH.CO_2H$ . Kromer, however, finds that this so-called purginic acid is a mixture of  $\alpha$ -methyl- $\beta$ -oxybutyric acid,  $CH_3.CH(OH)CH.(CH_3)CO_2H$  and the anhydride of the same acid.

**Radio-activity of Salts of Radium.** P. Curie and A. Debierne. (*Comptes rend.*, **133**, 276.) Salts of radium are capable of communicating a temporary radio-activity to almost any other substance, especially to distilled water. If an aqueous solution of radium chloride be distilled in a closed vessel, the distillate possesses considerable radio-activity. If two open vessels, one containing distilled water, the other a solution of a radium salt, are enclosed together in a closed vessel, after the lapse of a certain time the water becomes radio-active. If a solution of a radium salt be enclosed in a celluloid capsule, and this be plunged in water, although no trace of the salt permeates the wall of the capsule, the water becomes radio-active. If this water be kept in a sealed tube it loses most of its radio-activity in a few days, and much more rapidly if exposed in an open vessel. A solution of a radium salt also loses activity when exposed to the air, but this loss is not final, for on enclosing this weakened solution in a sealed tube, it gradually regains its normal radio-active power. It would seem that the radiant energy of radium salts is dissipated in two ways—by radiation and by conduction; that is, by transmission to adjacent bodies, by means of surrounding gas or liquid. This is greater in both cases, as the amount of stored energy in the radiant substance is greater. An equilibrium is thus established. In this respect the dissipation of radiant energy may be considered to be analogous to that of heat. If a constant disengagement of heat takes place in the interior of a body, this accumulates in the body

and the temperature rises until an equilibrium is established by radiation and conduction. Thus a body excited by radium salts is like a hot substance; it gradually loses its radio-activity in the same manner as a hot body cools. Solid radio-active matter does not sensibly lose its activity on exposure to the air, because radiant energy is not conducted, as a rule, through solids. If a radio-active solution be distilled, the distillate carries off a large proportion of the radio-active energy, and the solid residual salt only regains its normal activity gradually.

**Red Lead, Commercial, Assay of.** A. Jousser. (*Journ. Pharm. d'Anvers*, **57**, 231.) The amount of foreign impurity in commercial red lead is determined as follows. 2.5 Gm. of the sample is treated with 20 c.c. of nitric acid, sp. gr. 1.072 (1 part of strong acid, sp. gr. 1.39 with 4 parts of water) and the mixture is stirred in the cold. When the whole of the  $Pb_3O_4$  is converted into  $PbO_2$ , solution of hydrogen peroxide is gradually added, with constant stirring, until all the lead peroxide is dissolved. A few drops of hydrogen peroxide are generally sufficient. If the sample be pure, a clear solution will result. If it contain added foreign matter, such as colcothar, powdered brick, sand, or barium sulphate, these impurities will remain insoluble and may be collected, washed, dried, and weighed.

**Red Lead, Determination of Lead Peroxide in.** M. Liebig. (*Zeits. für angew. Chem.*, through *Moniteur scientif.* [4], **14**, 124.) 0.5 Gm. of the sample, in fine powder, is suspended in a little water in an Erlenmeyer flask. 25 c.c. of N/10 thiosulphate solution is then added, followed by 10 c.c. of acetic acid, shaking to aid solution; 10 c.c. of 10 per cent. KI solution is next added, and 2 or 3 c.c. of  $ZnI_2$  and starch indicator. The excess of thiosulphate is then titrated back with N/10 iodine solution. The number of c.c. used up, multiplied by 239, gives the amount of lead peroxide present. The end reaction, indicated by the passage of the liquid from lemon yellow to deep dull yellow, is very sharp.

**Rennet Ferment, Vegetable.** M. Javillier. (*Comptes rend.*, **134**, 1873.) The presence of a ferment resembling that of rennet is demonstrated in a number of plants, including *Lolium perenne*, *Anthriscus vulgaris*, *Plantago lanceolata*, *Capsella bursa-pastoris*, *Geranium molle*, *Ranunculus bulbosus*, *Medicago lupulina*

*Lamium hybridum*, *L. amplexicaule*, and *Philadelphus coronarius*.

**Rhododendron Chrysanthum, Constituents of.** Von Archangelski. (*Apoth. Zeit.*, **21**, 570.) Three new glucosides—rhododendrol, rhododendrin, and andromedotoxin—have been isolated from the leaves of *Rhododendron chrysanthum*. Rhododendrol,  $C_{10}H_{12}O_2$ , occurs in long, slightly bitter, colourless needles, melting at  $79-80^{\circ}C$ .; rhododendrin,  $C_{16}H_{22}O_7$ , in odourless, colourless crystals melting at  $187-187.5^{\circ}C$ ., which, on hydrolysis, yield rhododendrol and a hexose, according to the equation  $C_{16}H_{22}O_7 + H_2O = C_{10}H_{12}O_2 + C_6H_{12}O_6$ . Neither rhododendrin nor rhododendrol have any physiological action. Andromedotoxin resembles digitalin, and is very toxic. In addition to these, Thal has previously reported the presence of another glucoside—ericalin—in the same plant. The leaves of the plant have been used as a remedy for rheumatism.

**Robinin.** E. Schmidt. (*Chem. Centr.*, **72**, 121; compare also *Year-Book*, **1901**, 349.) The formula attributed by Zwenger to robinin, the glucoside of acacia blooms, is confirmed, but Schmidt differs from that author in the nature of the products of decomposition. He finds that robinin, when hydrolyzed, yields rhamnose and a yellow colouring matter, which, when dried at  $130^{\circ}C$ ., has the composition  $C_{15}H_{10}O_6$ , crystallizing from hot aqueous solution in fine needles. It closely resembles the rhamnolutin of Tschirch and Polacco. It forms an acetyl derivative,  $C_{15}H_8(O.C_2H_3O)_4$ , in colourless needles, melting at  $182-183^{\circ}C$ . The author does not consider Perkin's formula for robinin,  $C_{33}H_{38}O_{20} + 8H_2O$ , to be correct, nor does he find the products of its decomposition to accord with those given by that investigator.

**Rose Oil.** E. J. Parry. (*Chem. and Drugg.* **60**, 390.) The adulteration of otto of rose is not considered to be so largely practised as is generally believed, nor does the author agree with the inference of E. M. Holmes, that the white rose is distilled with the red because it yields more stearoptene, or that the otto of white rose is comparatively odourless. Exception is also taken to the statement of Gildemeister and Hoffmann that, "The enormous difference between the Bulgarian and German distillates is very striking, and not to be explained by mere reference to climatic differences. Rather startling also is the fact that

Bulgarian manufacturers have repeatedly exhibited, as especially fine products, oils that agreed closely with the German distillate in odour, congealing-point, and stearoptene-content. On the other hand, the oil which is obtained by distilling 2,500 kilos. of roses with 1 kilo. of geraniol cannot be distinguished from the Bulgarian oil of commerce."

The results obtained by Schimmel and Co. are entirely at variance with the statements quoted. According to Gildemeister and Hoffmann, an oil distilled in Leipzig had a sp. gr. of 0.8727, and optical rotation  $+0^{\circ} 49'$ . This oil was distilled from *Rosa centifolia*. The same authorities then mention two French oils examined by Dupont, and undoubtedly pure. Although these oils were distilled from *R. centifolia*, their sp. gr. were 0.8825 and 0.8407, and their optical rotations  $-6^{\circ} 45'$  and  $-8^{\circ} 3'$ . Schimmel and Co., in their semi-annual report (*Year-Book*, 1901, 107), give the figures for a number of samples examined in their own laboratory, of which two were Miltitz distilled oils, one was distilled in the presence of their own expert in Bulgaria, and another was obtained by him from a reliable merchant in the neighbourhood. The two German oils had sp. gr. 0.8872 and 0.8804 at  $30^{\circ}\text{C}$ .; the admittedly pure Bulgarian samples had sp. gr. at  $25^{\circ}\text{C}$ . of 0.8634, and 0.8614; the optical rotation of the German samples was in both cases under  $1^{\circ}$ , but in the Bulgarian samples was over  $-2^{\circ} 30'$ ; and the stearoptene content was 28.5 per cent. and 39.9 per cent. in the German, and 18.5 per cent. and 20.5 per cent. in the Bulgarian samples. These figures appear to be in direct contradiction to the inference drawn by Gildemeister and Hoffmann.

The statement that certain Bulgarian oils are to be met with, specially prepared for exhibition purposes, which agree with the German oil in the high percentage of stearoptene present, is contradicted. The author has not met with specimens of this nature. He contends that if this high stearoptene content were normal for pure Bulgarian oil, the amount of adulterant, presumably "Turkish geranium oil," which would be necessary to bring this oil, rich in stearoptene, down to the generally-accepted limits would be so large that its presence would be easily detected by the raising of the sp. gr. and the ester value. That such is not the case is supported by the figures given by 20 samples of various origin.



| Sample | S.G. at 30°C. | Opt. Rot. (100 mm.) | Cong. point | Sap Val. (P.c. KOH) | Stearoptene (Per cent) | S.G. of Oil without Stearop. | M.p. of Stearoptene |
|--------|---------------|---------------------|-------------|---------------------|------------------------|------------------------------|---------------------|
| 1      | 0.8565        | - 2° 30'            | 20°         | 0.75                | 19                     | 0.884                        | 33.5°               |
| 2      | 0.8565        | - 3° 17'            | 20.5°       | 0.80                | 18                     | —                            | —                   |
| 3      | 0.8555        | - 2° 25'            | 21°         | 0.69                | 18.5                   | —                            | —                   |
| 4      | 0.8540        | - 2° 30'            | 21.5°       | 0.74                | 19                     | 0.882                        | 33°                 |
| 5      | 0.854         | - 2° 32'            | 21°         | 0.91                | 20                     | —                            | —                   |
| 6      | 0.8545        | - 2° 25'            | 21.5°       | 0.90                | 18.5                   | 0.881                        | 34°                 |
| 7      | 0.8580        | - 2° 50'            | 22°         | 0.84                | 19.5                   | 0.886                        | 33°                 |
| 8      | 0.8515        | - 2° 50'            | 22°         | 0.81                | 20                     | —                            | 33.5°               |
| 9      | 0.8495        | - 2° 50'            | 23°         | 0.84                | 22                     | 0.8855                       | 34°                 |
| 10     | 0.8490        | - 2° 25'            | 23°         | 0.96                | 22.5                   | —                            | —                   |
| 11     | 0.8505        | - 2° 40'            | 22°         | 0.90                | 20                     | 0.884                        | 33.5°               |
| 12     | 0.8490        | - 2° 38'            | 22°         | 0.86                | 20.5                   | —                            | 34.5°               |
| 13     | 0.8540        | - 2° 46'            | 22.5°       | 0.81                | —                      | 0.887                        | 33.5°               |
| 14     | 0.8509        | - 2° 37'            | 22°         | 0.76                | —                      | —                            | —                   |
| 15     | 0.8505        | - 2° 46'            | 22°         | 0.78                | —                      | —                            | —                   |
| 16     | 0.8518        | - 3° 10'            | 21.5°       | 0.90                | —                      | 0.8835                       | 34°                 |
| 17     | 0.8515        | - 2° 50'            | 21°         | 0.86                | 19.5                   | 0.880                        | 35°                 |
| 18     | 0.854         | - 3°                | 20°         | 0.74                | 18                     | —                            | —                   |
| 19     | 0.852         | - 2° 45'            | 20°         | 0.90                | 18.5                   | 0.884                        | 34°                 |
| 20     | 0.849         | 2° 40'              | 21.5°       | 0.81                | 21                     | —                            | —                   |

In no case could any spermaceti or so-called guaiacum wood oil be detected in the stearoptene. Indeed, the characteristic crystalline form of the natural stearoptene of otto of rose is such, that any material addition of these bodies alter it so much that one easily recognizes that the otto has been tampered with. The ottos of the present season are, generally speaking, of a rather lower sp. gr. and slightly higher congealing-point than has been the case for the past two years.

The opinion is expressed that the adulteration of otto is largely a matter of price, and that genuine otto which has not been tampered with is readily obtainable. The fact observed by the author—that four seasons' supply, as used by a large English consumer, have proved practically identical in chemical and physical characters—shows that large quantities of constant character can be, and are, delivered.

**Rose Oil, Phenyl Ethyl Alcohol in.** H. von Soden and W. Rojahn. (*Berichte*, **34**, 2803.) The previous statement that phenyl-ethyl alcohol is only met with in ordinary steam distilled rose-oil in small proportions (*Year-Book*, **1901**, 108), because it is removed by the water, is proved to be correct. The total aqueous distillate from 50 kilos. of roses was extracted with ether. In this way 37.5 Gm. of oil, having the sp. gr. 0.944 at 30°C. was obtained. When redistilled with steam, only 10 per cent. of this

crude oil was recovered as otto separating from the water; the greater portion, equivalent to 67 per cent., was soluble in the water, and was recoverable by ether. From this it is evident that the normal content of rose oil in phenyl-ethyl alcohol is about 60 per cent., the whole of which is lost by the ordinary method of distillation.

**Rue Oil, Algerian, Constituents of.** H. von Soden and K. Henlé. (*Pharm. Zeit.*, **46**, 1026.) The authors have supplemented their investigations on Algerian rue oil (*Year Book*, **1901**, 108). They find that the total ketone content of the oil is about 90 per cent., 60 per cent. being normal methyl heptyl ketone, and 30 per cent. methyl nonyl ketone. The former is distinctly more powerful and aromatic than the latter, which probably accounts for the observed difference in odour of Algerian rue oil as compared with other kinds. In addition to these two ketones the oil contains some esters, probably acetates of the corresponding secondary alcohols.

**Rue Oil, Methyl Ester of Methyl-Anthranilic Acid in.** (*Schimmel's Report*, Oct., **1901**, 46.) The methyl ester of methyl-anthranilic acid is found to be a constituent of rue oil, as well as of mandarin oil. It was isolated by extracting the oil with dilute  $\text{H}_2\text{SO}_4$ . When saponified and treated with acetic acid, the basic oil liberates a crystalline acid which, when purified by sublimation, melts at  $173^\circ\text{C}$ . It is probably identical with methylanthranilic acid.

**Ruthenium Compounds, Some New.** J. L. Howe. (*Journ. Amer. Chem. Soc.*, **23**, 775.) If  $\text{RuO}_4$  be treated with  $\text{HCl}$  in the cold, a reddish-yellow solution is produced, which, by standing or warming, evolves chlorine and becomes dark red. By adding alkaline chlorides to this solution compounds of the formula  $\text{RuCl}_3 \cdot 2\text{XCl}$  are produced.

Cæsium-ruthenium-chloride  $\text{Cs}_3\text{RuCl}_5\text{H}_2\text{O}$  forms dark brown microscopic orthorhombic tables.

Rubidium-ruthenium-chloride  $\text{Rb}_2\text{RuCl}_5\text{H}_2\text{O}$  is very similar to the cæsium salt. When ruthenium tetroxide is mixed with little  $\text{HCl}$  and much alkaline chloride, compounds are formed according to the equation  $\text{RuO}_4 + 4\text{HCl} + 2\text{XCl} = 2\text{XClRuO}_2\text{Cl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$ .

Cæsium-oxychlor-ruthenate  $\text{Cs}_2\text{RuO}_2\text{Cl}_4$  and rubidium oxychlor-ruthenate were thus obtained in dark purple red crystals. They are instantly decomposed by water with production of a black precipitate. With  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$  decomposition occurs with

production of an odour of  $\text{RuO}_4$  or of ozone. By boiling with concentrated  $\text{HCl}$  the following reaction occurs:  $2\text{CsClRuO}_2\text{Cl}_2 + 4\text{HCl} = 2\text{CsClRuCl}_4 + 2\text{H}_2\text{O} + \text{Cl}_2$ .

Cæsium chlor-ruthenate  $\text{Cs}_2\text{RuCl}_6$  and rubidium chlor-ruthenate  $\text{Rb}_2\text{RuCl}_6$  form dark-brown octohedra, insoluble in cold water, slightly soluble in  $\text{HCl}$ . On heating with water a dark-brown solution is obtained and partial decomposition occurs. On addition of a drop of strong  $\text{HCl}$  to this solution a deep purple-red coloration is produced which soon disappears. This is the only reaction yet known by which the tetrachloride can be distinguished from the trichlorides. If a very dilute hydrochloric solution of cæsium-ruthenium tetrachloride be boiled with alcohol, a rose-coloured salt, crystallizing in prisms, is obtained. It is probably cæsium-aquo-chlor-ruthenate  $2\text{CsClRu}(\text{H}_2\text{O})\text{Cl}_3$ . This can also be obtained by the electrolytic reduction of the trichloride after precipitation with cæsium chloride.

On reduction of ruthenium trichloride, a blue solution is obtained, which is probably due to the formation of ruthenium dichloride  $\text{RuCl}_2$ . This substance could not be isolated, but by electrolytic reduction and addition of cæsium chloride, a blue solution resulted, containing a salt probably of formula  $3\text{CsCl} \cdot 2\text{RuCl}_2 \cdot 2\text{H}_2\text{O}$ .

**Rutin.** E. Schmidt and Waljaschko (*Chem. Centr.*, **72**, 121) find that the properties of rutin derived from *Ruta graveolens* agree with those attributed to it by Wachs. On decomposition it yields rhamnose, glucose, and quercetin, the last being identical with that obtained from quercitrin. The rutin of *Ruta graveolens* is, in any case, not identical with either robinin or quercitrin, but is very similar to the rutin isolated by Wachs from capers, and to the viola-quercitrin of the last-named author, and mandelin from *Viola tricolor*.

**Safrol, Pure, Characters of.** (*Schimmel's Report*, 1902, 99.) Until recently the sp. gr. of pure safrol has been given as 1.108. Results obtained in the manufacture of safrol of great purity, have indicated that this figure is too high. A redetermination of the sp. gr. of pure recrystallized safrol shows that the correct sp. gr. is 1.1058–1.106. This pure safrol congeals at  $11.2^\circ\text{C}$ .

**Sage Oil, German, New Hydrocarbon of.** H. Seyler. (*Berichte*, **35**, 550.) On refractionating over sodium the first fraction obtained by distilling German sage oil below  $155^\circ\text{C}$ ., the portion, boiling between  $142$  and  $145^\circ$ , was found to consist of a new hydrocarbon, salvene,  $\text{C}_{10}\text{H}_{18}$ . This had the sp. gr. 0.80 at  $20^\circ\text{C}$ ., and

the  $[\alpha]_D = + 1^\circ 40'$ . When oxidized with permanganate it gave an acid, the semicarbazone of which,  $C_{10}H_{16}O_2 \cdot CON_3H_3$ , melted at  $204^\circ C$ ., which is probably identical with  $\beta$ -tanacetoneketonic acid. No salvene was detected in Spanish sage oil.

**Sambucus Nigra, New Alkaloid in the Bark of.** F. Malméjac. (*Journ. Pharm. Chim.* [6], **14**, 17.) The powdered fresh bark was extracted with alcohol acidulated with tartaric acid, after the method of Stas. On evaporating the solvent at a low temperature on the water bath, the residue was taken up with water, the acid solution shaken out with several successive washings of ether, the aqueous portion rendered alkaline with sodium bicarbonate, and again shaken out with the same solvent. On evaporating the ether at a low temperature, minute crystals were seen to form, which ultimately melted, leaving a clear liquid which was basic in character, giving the usual alkaloidal reactions. This alkaloid has been named sambucine. It is extremely hygroscopic, passing from the crystalline state to that of an oily liquid soon after removal from the desiccator. Applied to the tongue it has a bitter taste and produces tingling. In addition to this base the bark contains a tannin, a purgative resin, and a reddish-yellow oil having a strong odour of elder. The leaves also contain alkaloid.

**Sandal Oil, West Indian, Occurrence of Dextro-cadinene in.** E. Deussen. (*Archiv der Pharm.*, **240**, 288.) By repeated fractionation and refraction, *in vacuo*, a portion was ultimately obtained which boiled at  $156$ – $159^\circ C$ . at 26 mm., and had the rotation  $+ 40^\circ$ , which on further fractionation gave a portion boiling at  $153$ – $154^\circ C$ . at 26 mm., and having the rotation  $+ 50^\circ$ . This gave a crystalline compound with HCl which, when crystallized from acetic ether, melted at  $117$ – $118^\circ C$ ., which is also the m.p. of cadinene hydrochloride. Cadinene boils, at ordinary pressure, at  $274$ – $275^\circ C$ ., has the sp. gr. 0.921 at  $16^\circ C$ ., and the  $[\alpha]_D = -98.56^\circ$ . The substance under notice boiled at ordinary atmospheric pressure at  $260$ – $261^\circ C$ ., had the sp. gr. 0.9247 at  $15^\circ$ , and the  $[\alpha]_D = + 54^\circ$ . It is therefore named dextro-cadinene; the residual oil after the separation of the cadinene hydrochloride, when treated with alkali and steam-distilled, had the  $[\alpha]_D = -32^\circ C$ . Another dextro-hydro-carbon oil, having the rotation  $[\alpha]_D + 11$  to  $16^\circ$ , is present, which appears to be allied to cadinene.

**Sandarac Resin, the Constituents of.** T. A. Henry. (*Proc. Chem. Soc.*, **17**, 187.) Sandarac of commerce is the naturally exuded resin of various species of *Callitris*, usually either *C. quadrivalvis* or *C. verrucosa*.

Both varieties of resin consist of a mixture of resin acids and terpenes, separable by steam distillation. From the latter, *d-pinene* has been isolated and identified. The chief volatile constituent is a di-terpene, boiling at  $265^{\circ}$ ,  $\mu_D = 1.5215$ ,  $[\alpha]_D = +55^{\circ}$ , which behaves like a saturated substance, forming no additive compounds with bromine, hydrogen chloride, or nitrosyl chloride. Two resin acids have been isolated and examined. One of these has the composition  $C_{20}H_{30}O_2$  (m.p.  $= 171^{\circ}C.$ , b.p.  $265^{\circ}C.$ , 11 mm.), and closely resembles in behaviour the isomeric *d-pimaric acid* of Vesterberg, but is optically inactive, and is therefore named *inactive pimaric acid*. On reduction with hydriodic acid it gives a di-terpene,  $C_{20}H_{32}$ . On oxidation with permanganate, pimaric acid yields acetic acid and a crystalline substance melting at  $206^{\circ}$ , which is probably *trimellitic acid*.

The second resin of sandarac has not been obtained in a crystalline form, but the highly deliquescent sodium salt and the characteristic lactone have been prepared; from analyses of these, the formula of the free acid is probably  $C_{30}H_{18}O_5$ . For this substance the name *callitricolic acid* has been retained. The acid is remarkably resistant to the action of reagents, being unattacked even by hot fuming nitric acid. When heated in a vacuum, it is decomposed with the formation of carbon dioxide and a diterpene identical with that occurring naturally in the resin.

**Sanguinaria Canadensis, Alkaloidal Constituents of.** R. Fischer (*Archiv.*, **239**, 409) finds that the alkaloids of *Sanguinaria canadensis* are:—chelerythrine,  $C_{21}H_{17}NO_4$ , sanguinarine,  $C_{20}H_{15}NO_4$ , homochelidonine,  $C_{21}H_{17}NO_5$ , and protopine,  $C_{20}H_{19}NO_5$ . When crystallized from alcohol chelerythrine obstinately retains a molecule of that body, as pointed out by Koenig, Tietz, and Wintgen, the clear rhombic crystals or crystalline crusts, even after repeated recrystallization from acetic ether, having the formula  $C_{20}H_{19}NO_5 \cdot C_2H_5OH$ . This melts at  $203^{\circ}C$ . In mass, the pure alkaloid has a distinct pinkish tinge. It forms yellow salts, and is a strong base. When liberated by ammonia it gives figures showing an excess of nitrogen over the amount required by the above formula. Precipitated by soda, and recrystallized from toluol, it gives small crystals melting at  $257^{\circ}C.$ , but losing weight at  $100^{\circ}C.$ , evolving at the same time an odour of toluol. It is probably, therefore, a combination of the base with one molecule of that solvent. After driving off this toluol the base gives figures concordant with the formula  $(C_{21}H_{17}NO_4)_2H_2O$ . The base therefore evidently retains with marked energy a portion of the solvent

from which it is separated. Sanguinarine behaves in a similar manner. From alcoholic solutions it gives the molecule  $[(C_{20}H_{15}NO_4)_2 \cdot C_2H_5OH.]$  as stated by Koenig. Tietz has given the formula as being  $[(C_{20}H_{15}NO_4)_2 \cdot H_2O]$ , so that it is probably modified by the menstruum from which it is separated. Sanguinarine forms deep-red salts, not yellow like those of chelerythrine; it occurs in acicular crystals, which, recrystallized from acetic ether, melt at  $211^\circ C.$  (uncorr.). Homochelidonine occurs in two physically isomeric forms  $\beta$ - and  $\gamma$ -homochelidonine, which are mutually convertible, having the formula  $C_{21}H_{23}NO_5$ , and not  $C_{21}H_{21}NO_5$ , as stated by Koenig. The protopine of *Sanguinaria*,  $C_{20}H_{19}NO_5$ , is shown to be identical with that of other members of the natural order.

**Saponaria Officinalis, New Glucoside in.** G. Barger. (*Berichte*, **35**, 1296.) The so-called structureless soluble starch, which has long been known, is now shown to be a peculiar glucoside, saponarin. The dried leaves of *Saponaria* were extracted with water, acidulated with acetic acid, and set aside. The dirty white deposit which was thus thrown down was collected, and purified by re-solution in water and re-precipitation with acetic acid. When pure, it forms minute needles. It is very sparingly soluble in cold water, more soluble in hot water and in alcohol, and insoluble in most solvents. It dissolves in strong  $H_2SO_4$ , giving a yellowish-blue fluorescent solution. It gives a strong golden yellow colour with alkalis. Its aqueous solution gives a blue colour with iodine which disappears on warming, but returns as the liquid cools. It is apparently the glucoside of a flavone derivative, and has some properties analogous to scutellarin.

**Scatocyanin.** E. Schunck (*Chem. News*, **85**, 1), in a communication to the Royal Society, describes a new crystalline chlorophyll derivative, obtained from the faeces of grass-fed cows. It resembles phyllocyanin, but is not identical with it, and has been named scatocyanin. It is obtained by extracting cow dung, after pressure between folds of paper, with cold chloroform, filtering, and evaporating in a warm place, when a quantity of lustrous, purplish-blue crystals separate in the form of spangles. These are collected and washed with alcohol. It may also be obtained by dissolving in chloroform the flocculent deposit thrown down, on cooling, from a hot alcoholic extract of cow dung. It occurs in rhombic plates, or elongated, flat prisms, pale brown by transmitted light, with a brilliant metallic lustre by reflected light.

It does not sublime. It is almost insoluble in boiling alcohol, ether, carbon disulphide, and benzol, but dissolves more readily in chloroform, which solution gives five absorption bands almost identical with those of phyllocyanin. It gives a fine crimson solution with boiling glacial acetic acid. It separates on cooling from a saturated boiling solution of this acid in fine lustrous needles. The solution in  $H_2SO_4$ , diluted with several times its volume of water, changes from purplish blue to fine purple, without precipitating. On standing, it becomes nearly colourless, depositing rosettes of lustrous needles, probably unchanged scatocyanin. Another crystalline substance, more soluble in alcohol than scatocyanin, which occurs as a dull-red mass of crystalline needles, is sometimes, but not invariably, present in the fæces of grass-fed ruminants. Its chloroformic solutions show no absorption bands; the solution in  $H_2SO_4$  when diluted with water, is at first reddish yellow, then a fine violet colour. No unchanged chlorophyll was found in the excreta, contrary to published statements to that effect, but, in addition to the above, phylloxanthin, or a body closely allied to it, is present. The two crystalline bodies described are believed to be new chlorophyll derivatives.

**Scutellaria Altissima, Constituents of.** Molisch and Goldschmiedt. (*Pharm. Centralt.*, **42**, 616, after *Chem. Zeit.*) *Scutellaria altissima* is found to contain a new yellow crystalline compound, scutellarin,  $C_{21}H_{20}O_{12}$ , which is isolated from the aqueous extract of all parts of the plant, which contains, as well, cinnamic and fumaric acids. A similar substance is found in all species of *Scutellaria* and in certain other Labiates. By treatment with  $H_2SO_4$  it is decomposed, forming scutellarein  $C_{15}H_{10}O_6$ , and another body not yet identified, but no sugar. Scutellarein forms salt-like compounds with mineral acids, and is split up by the action of alkalis into para-oxy-benzoic acid, and phloroglucin.

**Shellac, The Analysis of.** E. J. Parry. (*Chem. and Drugg.*, **59**, 689 and **60**, 670.) The author considers that the sp. gr. of the specimen affords little indication as to its purity, since the figure varies so widely for pure shellac and for its commonest adulterant, rosin. Nor is the suggested test of Oberdoerffer with petroleum ether reliable, since although rosin is generally much more soluble in that liquid than shellac, the solubility varies greatly with rosin from different sources.

The only determinations upon which much reliance can be placed are the iodine absorption, the free acid, and the ester

numbers. Numerous figures have been published for the acid value of shellac, but an inspection of these shows that the samples examined were in many cases adulterated. The typically pure samples examined by the author gave acid values of between 55 and 65; although further experience may lead to a modification of these figures, 60 is the average, and gives a reasonable basis for calculation for samples of unknown origin. The acid value of common rosin is variable between wider limits; typical samples gave results from 150 to 170, with an average of 162, so that approximate results may be obtained by using 160 as the basis of calculation.

The ester values are equally divergent in the two resins. Pure shellac gives figures varying between 155 and 175, with an average of 168. Kremel has recorded figures between 50 and 102, but these obviously represent samples adulterated with rosin. The ester value of rosin seldom reaches 20—averaging about 10, a figure obtained regularly with commercial samples. It is thus obvious that a combination of these two determinations will indicate very fairly the amount of adulteration.

Equally valuable is the determination of the iodine absorption, which is very low in the case of shellac, and very high in that of rosin. The figures published by different observers for shellac vary from 7 to 29, but samples yielding so high a figure as the latter must be regarded with great suspicion. The limits 4 to 10 cover the genuine samples that have been examined, the average value being 6. Rosin, on the other hand, has a fairly constant iodine value of 105 to 120, averaging about 110. Here, again, the figures are not constant enough to allow an exact calculation, but a combination of the three figures—viz., the acid, ester, and iodine values—will allow a very approximate estimation to be arrived at.

There can be no doubt that many of the statements recorded in various works are quite useless as a guide to the analyst. The solubilities given by Dieterich in his *Analyse der Harze*, and to which he appears to attach importance, are useless for analytical purposes. In dealing with a mixture of resins which have been melted together, if one is practically insoluble in a given solvent, the powdered resin is protected to a very great extent from the action of the solvent even when a considerable amount of a soluble resin is present. The protective action depends to a great extent on the fineness of the powder, but no solubility determinations yield anything like quantitative results. Nor can the constants quoted be relied upon, as many of the samples dealt with are unmistakably adulterated. For example, in that useful little work by Lewko-



witsch which has recently appeared (*Laboratory Companion*), one sample only of shellac is quoted, but from the figures given it was clearly adulterated.

Experiments point to the determination of the iodine-absorption value as by far the most reliable of all methods for ascertaining the amount of common resin present. So long as the conditions of the determination are kept constant, very concordant results can be obtained. No pure sample examined has given figures anything like so high as those so often quoted, and, with experimental mixtures, the results are more concordant than those obtained by the determination of the acid and ester numbers. Of adulterated samples met with during the last few months, many contained from 20 to 35 per cent. of resin and some over 40 per cent.

**Silicon Hydride, Preparation and Properties of a New.** H. Moissan and S. Smiles. (*Comptes rend.*, **134**, 569.) Magnesium silicide is first prepared by fusing together, in a current of hydrogen, magnesium powder and pure silicon. This, when treated with dilute HCl, gives off a mixture of gases which take fire spontaneously on coming in contact with the air. If however, a portion of the apparatus through which the gas passes be cooled to  $-180$  or  $-200^{\circ}\text{C}$ . by means of liquid air, condensation takes place, a white solid is formed, and the issuing gas loses its property of spontaneously igniting. If the temperature be now allowed to rise, the solid substance melts and speedily begins to boil, evolving a gas, and leaving a colourless liquid at ordinary temperatures, which is the new silicide,  $\text{Si}_2\text{H}_6$ . It inflames spontaneously in the air with a brilliant white flame; it boils at about  $52^{\circ}\text{C}$ ., and crystallizes when cooled by means of liquid air; these crystals melt at  $-138^{\circ}\text{C}$ . A small quantity of this body, volatilized in an atmosphere of hydrogen, imparts to that gas the property of spontaneous inflammability. Since pure  $\text{SiH}_4$  has been shown not to be spontaneously inflammable, the ignition of that gas, as generally obtained, must be due to the presence of the new hydride just as the presence of a small quantity of liquid  $\text{PH}_3$  causes a large volume of  $\text{PH}_3$  to ignite on contact with air. The liquid hydride is denser than water, in which it is slightly soluble. It ignites with violence in chlorine, and is dissociated into its elements at  $250^{\circ}\text{C}$ . It is energetically attacked by caustic alkali, forming a silicate and evolving hydrogen.

**Silver Arsenite, Yellow.** J. A. Wanklyn. (*Chem. News*, **85**, 181.) The yellow precipitate obtained by the well-known reaction of passing  $\text{AsH}_3$  into a solution of  $\text{AgNO}_3$ , neutralized by ammonia,

is not, as generally stated,  $2\text{Ag}_2\text{O}.\text{As}_2\text{O}_3$ , but has the composition  $3\text{Ag}_2\text{O}.\text{As}_2\text{O}_3$ . It is best obtained by passing the gas into the  $\text{AgNO}_3$  solution, filtering out the reduced Ag precipitated, and neutralizing the filtrate cautiously with  $\text{AmHO}$ . Prepared synthetically, from a known quantity of  $\text{As}_2\text{O}_3$ , the amount of  $3\text{Ag}_2\text{O}.\text{As}_2\text{O}_3$  obtained is found to be in accordance with theory. Thus prepared, the salt retains its yellow colour on drying.

**Sodium Benzoate, The Assay of.** F. H. Alcock. (*Pharm. Journ.* [4], 14, 274.) If 0.5 Gm. of sodium benzoate and 0.5 Gm. of ammonium chloride be dissolved in 10 c.c. of distilled water and evaporated to dryness, the loss of weighed substances is very small—about 0.008 Gm. If the mixed solids be now gently ignited, dense fumes are given off, and if a sheet of glass be placed over the heated porcelain dish a mass of crystals is condensed and will be found to contain benzoic acid and be quite free from ammonia. Dissociation takes place. The residue in the dish is free from carbon according to the purity of the solids used, and consists of sodium chloride only. The weight of these crystals when perfectly dried was found to be 0.197 Gm., and they were free from alkaline substances as indicated by litmus paper. Subsequent titration of the residual sodium chloride dissolved in 10 c.c. of water with  $\text{N}/10 \text{ AgNO}_3$ , using neutral potassium chromate as indicator, required 33.8 c.c. for complete precipitation, corresponding to 39.25 per cent. of sodium chloride or 96.67 per cent. sodium benzoate, which nearly agrees with the standard demanded by the Pharmacopœia, this being from 97.24 to 96.67 per cent. No commercial specimen of the salt which entirely responded to the official requirements has been met with in a large number examined.

**Sodium Methyl Arsenate (Arrhenal), Titration of.** A. Astruc. (*Comptes rend.*, 134, 660.) Sodium methyl arsenate may be titrated directly with  $\text{N}/10$  or  $\text{N}/20 \text{ NaOH}$  solution, using litmus or rosolic acid as an indicator. One molecule,  $\text{CH}_3.\text{AsO}(\text{ONa})_2$  is equivalent to one molecule of alkali. Phenolphthalein and methyl orange are not suitable indicators for the purpose.

Adrian and Gullat (*ibid.*, 1231) state that all determinations of the salt, to which they attribute the formula  $\text{CH}_3.\text{AsO}(\text{ONa})_2 + 6\text{H}_2\text{O}$  by means of alkalimetric analysis, with various indicators are incorrect, the end reaction varying greatly with the degree of concentration of the solution operated on. The arsenic should be determined by precipitating with an excess of  $\text{N}/10 \text{ AgNO}_3$  solution, then titrating back the excess of  $\text{AgNO}_3$  in

an aliquot part of the supernatant liquid by Volhard's method. 1 molecule of sodium methyl arsenate is equivalent to 2 molecules of silver nitrate.

**Sodium Phosphate, a So-called New.** H. Joulie. (*Comptes rend.*, **137**, 605.) By treating crystalline disodic phosphate with sufficient phosphoric acid sp. gr. 1.35, to produce a neutral reaction with litmus, about 210 c.c. of acid being requisite for 1,000 Gm. of the salt, a mass is obtained which quickly dissolves with a great fall of temperature. If this liquid be evaporated on the water bath until a pellicle forms on the surface, and then crystallized, it forms oblique prisms, which are sesquisodic phosphate,  $\text{Na}_3\text{H}_3\text{P}_2\text{O}_8$ . Since this salt is extremely soluble in water, neutral, and pleasant in taste, it is suggested that it will prove useful as a therapeutic agent, the more so as it is more active than the disodic phosphate usually employed in medicine. The dose of the new salt is, as a tonic, 15 grains, as a laxative, 75 grains, and as a purgative, 150 grains.

J. B. Senderens points out (*ibid.*, 713) that this sesquisodic phosphate is not, as supposed by Joulie, a new salt, since it has been previously described by the author and Filhol in 1882.

**Storax, American, Constituents of.** A. Tschirch and L. van Itallie. (*Archiv.*, **239**, 532.) The secretion of *Liquidambar styraciflua* closely resembles that of *Liquidambar orientalis*, consisting of free cinnamic acid, vanillin, styrol, styracin, cinnamic phenyl-propyl ester, and styresinol, partly free and partly as the cinnamic ester. Styresinol has the same molecular composition,  $\text{C}_{16}\text{H}_{26}\text{O}_2$ , as storesinol from Oriental storax and the same melting point, 161–162°C., but is much more active optically, its specific rotation being + 52° as compared with + 13° 30' of storesinol. American storax contains no ethyl cinnamate.

**Storax, Oriental (Liquidambar Orientalis), Constituents of.** A. Tschirch and L. van Itallie. (*Archiv.*, **239**, 506.) Liquid storax consists of a mixture of free cinnamic acid, vanillin, styrol, styracin, cinnamic ethyl ester, cinnamic phenyl-propyl ester, and storesinol partly free, and partly as the cinnamic ester. It contains no benzoic acid. Storesinol has the composition,  $\text{C}_{16}\text{H}_{26}\text{O}_2$ , and is a white, odourless, adhesive powder, melting at 156–161°C. With potash it forms a crystalline compound, separating in needles. It yields benzol, toluol, and phenol on distillation with zinc dust. When treated with  $\text{H}_2\text{SO}_4$  a derivative styrogenin of the formula  $\text{C}_{26}\text{H}_{40}\text{O}_8$  is obtained, and by the action of HBr or HI a crystalline compound  $\text{C}_{16}\text{H}_{26}\text{O}_3$  results.

**Strawberries and Strawberry Juice, Salicylic Acid a Natural Constituent of.** L. Portes and A. Desmoulières. (*Journ. Pharm. Chim.* [6], **14**, 392.) Salicylic acid is a normal constituent of strawberries and natural strawberry juice, in which it is probably present as methyl salicylate. It occurs both in wild and cultivated fruits. The authors controvert the statement of Truchon and Martin Claude that the coloration obtained with ferric chloride in an ethereal extract of strawberry juice is due to a tannin, and demonstrate that the method of removing this, advocated by the authors, also removes the salicylic acid. They have further succeeded in isolating the acid in a crystalline condition, and confirm its identity by other reactions.

**Strontium Hydride.** H. Gautier. (*Comptes rend.*, **133**, 1005, and **134**, 101.) By heating alloys of strontium and cadmium in an atmosphere of hydrogen, strontium hydride,  $\text{SrH}_2$ , is obtained; under reduced pressure, at a heat of incipient redness, the cadmium is volatilized and the strontium hydride left in a spongy condition. When all the cadmium has been distilled off, the temperature is raised to fuse the  $\text{SrH}_2$  left. The operation is conducted in boats of compressed magnesia.  $\text{SrH}_2$  is a white solid which readily decomposes water, forming strontia and liberating hydrogen; in general properties it closely resembles calcium hydride.

**Strychnine, Bromine Reaction for.** J. C. Wharton. (*Journ. of Pharmacol.*, through *Pharm. Zeit.*, **47**, 180.) The chloroformic extract of the suspected substance or the chloroformic residue of extraction is placed in a small test tube which is then immersed in a larger tube containing boiling water. When all  $\text{CHCl}_3$  has evaporated, a few drops of a mixture of  $\text{H}_2\text{SO}_4$  and water are added, and the chloroform residue dissolved. When solution is complete the tube is removed from the water bath and filled with the vapour of bromine by pouring the vapour from a flask containing a little bromine. It is then shaken and replaced in the boiling water, to drive off the excess of bromine. In the presence of an appreciable quantity of strychnine a carmine-red colour appears which increases in intensity as the bromine evaporates. If but a trace of strychnine be present only a small quantity of bromine should be used; a solution of Br in  $\text{CHCl}_3$ , containing one drop in 2 or more c.c.'s of the solvent, is then a convenient reagent.

**Stylophorum Diphyllum, Constituents of.** J. O. Schlotterbeck and H. C. Watkins. (*Journ. Amer. Chem. Soc.*, **24**, 1.) The dried root of this Papaveraceous plant contains: chelidonine,

$C_{20}H_{19}NO_5 \cdot H_2O$ , m.p.  $136^\circ C.$ ; stylopine,  $C_{19}H_{19}NO_5$ , m.p.  $202^\circ C.$ ; protopine,  $C_{20}H_{19}NO_5$ , m.p.  $204-205^\circ C.$ ; diphylline, m.p.  $216^\circ C.$ ; sanguinarine, chelidonic acid,  $C_7H_4O_6 \cdot H_2O$ , and a yellow colouring matter, chelidoxanthin. Subsequent examination of this last substance (*Pharm. Review*, **20**, 4) shows, however, that although agreeing with Probst's chelidoxanthin, as isolated from *Chelidonium majus*, it is, in fact, nothing but pure berberine. It is concluded therefore that the body isolated by Probst from *Chelidonium majus* was also berberine.

**Tabernanthe Iboga, Constituents of.** J. Dybowski and E. Landrin. (*Comptes rend.*, **133**, 748.) The bark and root of iboga are considered by the natives of the French Congo to possess stimulant and aphrodisiac properties resembling alcohol in effect, without disturbing the intellect. The authors attribute these properties to an alkaloid, ibogaine, which is generally distributed in the plant, but which occurs in greatest quantity in the root. It is extracted by treating the powdered root, mixed with lime, with ether; from the ethereal solution it is shaken out with dilute acids. On treating the acid solutions with alkali, two alkaloids are precipitated, one amorphous, the other crystalline; the latter, ibogaine, being much less soluble in alcohol, is separated by the use of that solvent. It forms faintly amber-coloured transparent prisms several millimetres long, with rectangular bases, and terminated by inclined facets. It is almost insoluble in water, readily soluble in hot alcohol. The m.p. is  $152^\circ C.$  The base has a peculiar astringent taste, somewhat resembling that of cocaine. The rotation in alcoholic solution is  $[\alpha]_D = -48^\circ 32'$  for 200 mm. It is readily oxidized in the air, forming a yellowish-brown amorphous body. All the salts of ibogaine except the hydrochloride are amorphous. Its empirical formula is  $C_{66}H_{66}N_6O_3$ . It has a powerful physiological action; in small doses it is a stimulant; in quantity it produces intoxication similar to that produced by alcohol.

A. Haller and E. Heckel (*ibid.*, 850) have also isolated a base from material which may not be identical with that employed by Dybowski and Landrin, since several allied plants are known as iboga in the Congo district. The root bark, the bark and leaves all contain the base, which is extracted by chloroform or alcohol, after fatty matter has been removed by petroleum ether. The alkaloid thus extracted is redissolved in acidulated water, reprecipitated by ammonia and crystallized from alcoholic solution by spontaneous evaporation. Since the alkaloid is readily altered

by contact with the air, a better method is to extract with cold ether a mixture of the powdered bark and magnesia which has previously been moistened with water and dried. The alkaloid is shaken out from the ethereal extract in the usual manner with acidulated water. When pure it gives white crystals, melting sharply at  $152^{\circ}\text{C}$ . It is gradually decomposed on heating in solution, forming a yellow viscous amorphous substance. Its solution in benzene is laevorotatory, having the  $[\alpha]_{\text{D}} = -12^{\circ} 88'$ . The empirical formula is  $\text{C}_{26}\text{H}_{32}\text{N}_2\text{O}_3$ . It gives no indication of being of a glucosidal character. The name ibogine has been given to this base. In addition to this the stem bark contains another crystalline principle, separating in fine needles or scales, melting at  $206\text{--}207^{\circ}\text{C}$ ., which has not yet been identified.

**Tantalum.** H. Moissan. (*Comptes rend.*, **134**, 211.) By reducing niobite in the electric furnace with sugar charcoal a mixture rich in niobium and tantalum is obtained. The metallic mass is heated with hydrofluoric and nitric acids, then with potassium fluoride, by which means a mixture of potassium fluorotantalate and fluoxy-niobate is obtained. The former salt being insoluble, the mixture is repeatedly extracted with boiling water, and the insoluble residue decomposed with  $\text{H}_2\text{SO}_4$ . The product after calcination still retains some sulphur. It is mixed with 10 per cent. of ammonium carbonate and again calcined. After repeating this operation pure  $\text{Ta}_2\text{O}_5$  is obtained. This pure tantalic acid is mixed with sugar charcoal heated in a Perrot furnace, to give it the requisite consistence, formed into cylinders and reduced in a graphite tube in the electric furnace for 10 minutes, with a current of 800 ampères and 60 volts. Thus obtained, tantalum is a brilliant metal, with a crystalline fracture scratching glass and rock crystal, having the density 12.79. When powdered and gently warmed it takes fire in fluorine at ordinary temperatures, is slightly attacked by chlorine at  $150^{\circ}\text{C}$ ., and with incandescence at  $250^{\circ}\text{C}$ ., forming tantalum chloride in long orange needles which sublime without decomposition in an atmosphere of chlorine. Bromine may be distilled over tantalum without reaction, but at a dull-red heat a bromide is sublimed, and at the fusing point of glass complete combination takes place. Iodine does not combine with tantalum at  $600^{\circ}\text{C}$ . The metal does not burn in oxygen below  $600^{\circ}\text{C}$ . Sulphur, selenium, and tellurium do not unite with tantalum at  $700^{\circ}\text{C}$ . It does not form a nitride when heated with nitrogen to  $1200^{\circ}\text{C}$ . Phosphorus, arsenic, and antimony do not unite

with it. Gaseous  $\text{HCl}$  attacks the metal, forming a white sublimate which darkens on heating, liberating hydrogen.  $\text{SO}_2$  is reduced by tantalum, with incandescence, at about  $500^\circ\text{C}$ ., an abundant deposit of sulphur and an oxide of tantalum being formed. Nitrous and nitric oxides combine with it at the same temperature. Phosphoric anhydride is reduced, below redness, giving abundant vapours of phosphorus. Arsenic acid and manganese dioxide are reduced by powdered tantalum, the latter with incandescence;  $\text{HgCl}$  and  $\text{HgCl}_2$  are both reduced.  $\text{KClO}_4$  does not react with tantalum even when fused to its decomposing point; niobium on the contrary is readily attacked. Nitrate of potassium attacks it slowly as it does niobium. Acids, except concentrated sulphuric acid, are without action on the metal. The reducing action of tantalum being so marked, indicates that it approaches nearer to the metalloids than to the true metals. In this respect it resembles niobium, the reducing power of which is even greater.

**Taxine, the Alkaloid of Yew.** T. E. Thorpe and G. Stubbs. (*Proc. Chem. Soc.*, **18**, 123.) The alkaloid was extracted from the autumn-gathered, air-dried leaves of *Taxus baccata*, by maceration in 1 per cent.  $\text{H}_2\text{SO}_4$  solution. The acid liquor was rendered alkaline without previous concentration, and shaken out with ether. Taxine was obtained in the form of very fine glistening particles, by crushing down the ethereal residue. It is very prone to change, at least two bodies resulting from the action of dilute acids on it. Although analytical data support the formula  $\text{C}_{37}\text{H}_{32}\text{NO}_{10}$ , given to taxine by Meyer and Brand (*Year-Book*, **1890**, 65), the material available was not sufficient to confirm this with certainty.

**Telluric Acid.** A. Gutbier (*Berichte*, **34**, 2114) finds that telluric acid has not the formula  $\text{H}_2\text{TeO}_4 \cdot 2\text{H}_2\text{O}$ , as generally stated. Cryoscopic and other physical and chemical data point to the formula  $\text{H}_4\text{TeO}_6$  as being correct. Its crystals do not belong to the monoclinic system as previously stated, but to the hexagonal rhomboid system. It is a very weak acid, like  $\text{H}_2\text{S}$  or  $\text{HCN}$ , and cannot be directly titrated alkalimetrically. It does not form esters, and is quantitatively reduced by hydrazine and its salts. It forms no double salt with lead or silver nitrate, contrary to the statements of Oppenheimer to that effect. On melting, its salts are reduced to the tellurous state. It forms a salt with aniline, but oxidizes diamine. Potassium tellurate occurs in two forms,

$K_2TeO_4 \cdot 5H_2O$  and  $K_2TeO_4 \cdot 2H_2O$ , the latter salt being isomorphous with potassium osmate,  $K_2OsO_4 \cdot 2H_2O$ .

**Tellurium Tetrachloride.** V. Lenher. (*Journ. Amer. Chem. Soc.*, **24**, 188.) On treating pure tellurium with excess of sulphur monochloride, reaction takes place at ordinary temperatures, according to the equation,  $Te + 2S_2Cl_2 = TeCl_4 + S_4$  and fine white silky needles of  $TeCl_4$  separate out, the sulphur being dissolved in the excess of sulphur chloride. The crystals are then drained, and washed with  $CS_2$  in which they are insoluble. They are permanent in dry air, but oxidize in the presence of moisture.

**Thymus Gland, Proteolytic Enzyme of.** F. Kutscher. (*Chem. Centr.*, **73**, 57, after *Zeits. Physiolog. Chem.*) Minced thymus gland is digested in chloroform water for 24 hours at ordinary temperatures and then allowed to stand for 3 weeks in a closed flask at  $37^\circ C$ . The liquid is then treated with baryta water, which causes evolution of much ammonia. The excess of baryta is removed by  $CO_2$  and the liquid concentrated to a syrup. The syrup is mixed with water, acidified slightly with nitric acid and precipitated with 10 per cent. silver nitrate solution, filtered from the precipitate of silver chloride and purine compounds of silver, and treated again with 10 per cent. silver solution and baryta water. The precipitate thus obtained (No. 1) is decomposed by  $H_2S$  and the liquid treated with phosphotungstic acid, whereby the purine bases are almost completely precipitated, mere traces only remaining in the liquid. The liquid is filtered and the phosphotungstic acid removed. On concentration, crystals of thymine are obtained. The filtrate from precipitate No. 1 is treated according to the procedure of von Kossel, and lysine is found to be present. By the auto-digestion of the thymus gland, therefore, only two of the known albumin decomposition products are obtained, viz., ammonia and lysine.

**Tin, Flame Test for.** O. Schmattolla. (*Chem. Centr.*, **72**, 57.) Tin may be detected in strong hydrochloric acid solutions by the following simple test:—A glass or porcelain rod, or a test tube filled with cold water, is dipped in the acid solution. The wet tube is then introduced into a colourless Bunsen flame. In the presence of tin, an intense bluish-white flame will be observed enveloping the glass cylinder, which continues until the  $HCl$  is evaporated. Antimony does not interfere with this reaction. Arsenic, if present in more than equal quantity, prevents the formation of the colour, and leaves the tube coated with a dark layer of arsenic and tin. A very minute trace of



tin may be thus detected by employing small quantities of acid and dipping the tube several times in succession in the solution. Platinum wire does not give the reaction.

**Tobacco, Occurrence of Paraffins in.** T. E. Thorpe and J. Holmes. (*Proc. Chem. Soc.*, **17**, 170.) Two paraffins, hentriacontane  $C_{31}H_{64}$ , melting at  $67.8-68.5^{\circ}C.$ , and heptacosane  $C_{27}H_{56}$ , melting at  $59.3-59.8^{\circ}$ , have been found to be present in the petroleum ether extract of tobacco leaf. In Kentucky and Virginia leaf the mixed hydrocarbons had the following melting points: Western leaf,  $63-63.8^{\circ}C.$ ; "wrappers,"  $63.5-64.0^{\circ}C.$ ; "fillers,"  $63.7-65.0^{\circ}C.$  Probably the mixture of these paraffins is identical with the snow-white substance of satiny lustre isolated from tobacco leaf in 1883 by Kissling, which he regarded as probably an impure mellisyl mellisate, and also the substance of similar appearance found by him in tobacco-smoke, melting at  $64.5^{\circ}C.$  These paraffins have been found in all American tobaccos, in which they occur to the extent in the aggregate, or rather more than 1:1,000.

**Tragacanth, Some Constituents of.** Tollens. (*Chem. Centr.*, **72**, 40.) The gum exhibits many properties analogous to those of pectin. Oxybassorin  $(C_{11}H_{20}O_{10})_2O$ , which was isolated by Hilger and Dreyfus, and stated by them to contain no carboxyl groups, although it possesses an acid character and has two hydrogen atoms replaceable by metals, is considered by Tollens to possess two such groups, which would require a formula containing less water than that given above. On hydrolysis, tragacanth has yielded to Widstoe and Tollens, and also to Oshima, fucose, as well as arabinose.

**Turpentine Oil, Adulteration of with "White Spirit."** A. and P. Androuard. (*Journ. Pharm. Chim.* [6], **15**, 99.) The adulteration of American oil of turpentine with a specially-prepared hydrocarbon oil, known as "white spirit," is stated to be very prevalent, no less than six out of nine samples examined having contained this fraudulent addition. "White spirit" is a colourless liquid, having a bluish fluorescence; the sp. gr. at  $15^{\circ}C.$  is 0.807, the rotation  $[\alpha]_D = -1.2^{\circ}$  for 200 mm. The fraud is readily detected by the low sp. gr. and rotation, also by the excess of residue on distillation at  $205^{\circ}C.$ , at which temperature pure oil of turpentine does not leave more than 6 per cent. of non-volatile residue. Adulterated samples were found to vary in sp. gr. from 0.860 to 0.867; in rotation from  $-52.2$  to  $-57.0^{\circ}$  for 200 mm., and gave 16 to 25 per cent. non-volatile residues at  $205^{\circ}C.$

**Urine, Detection of Albumin in.** Polacchi (*Chem. and Drugg.*, **60**, 82) employs the following reagent for the detection of albumin in urine: Tartaric acid, 1; corrosive sublimate, 5; sodium chloride, 10 parts; distilled water, 100 fluid parts. To this solution add formalin, 5 fluid parts.

To two c.c. of this reagent carefully add 3 or 4 c.c. of the urine to be tested, so that the liquids do not mix, but the urine forms a supernatant layer. A white ring appears at once at the zone of contact if pathological albumin be present. If the ring is not evident for 10 or 15 minutes the urine may be considered normal, and the trace of albumin thus demonstrated so insignificant that it may be disregarded. This test is claimed to be sensitive to albumin in the dilution of 1:370,000.

**Urine, Detection of Albumin and Albumoses in.** Sahli. (*Schweiz. Woch. für Chem. und Pharm.*, **40**, 40.) The urine to be examined is rendered acid with a few drops of 3 per cent. acetic acid, and then mixed with one-sixth of its volume of concentrated NaCl solution (30 per cent.). In the presence of any significant amount of albumin a precipitate forms, which increases on heating. If the precipitate obtained in the cold disappears or decreases in amount on warming, albumose is present. The hot liquid is then filtered and allowed to cool, when albumose will be apparent in the cold filtrate. Nucleo-albumin and resin acids also give precipitates under these conditions. The latter may be identified by their solubility in ether; nucleo-albumin may be detected by diluting the urine with water and adding nitric acid, when, in its presence, a precipitate or turbidity will be evident.

**Urine, Metaphosphoric Acid as a Reagent for Albumin in.** (*Merck's Report*, 1901, 36.) Although Bruylants pointed out the value of metaphosphoric acid as a test for albumin in urine over 20 years ago, the value of the test, which appears to have been overlooked, warrants attention being again directed to it. A fragment of the acid is dissolved in a little water and the suspected urine poured into the solution. Any albumin present will be thrown out as a flocculent precipitate. The solution of acid should be freshly prepared; otherwise it will be converted into orthophosphoric acid, which does not precipitate albumin.

**Urine, Detection of Sugar in, by means of O-nitrophenyl-Propiolic Acid.** G. Ruini. (*Chem. Centr.*, **73**, 72, after *Boll. Pharm. Chim.*) The urine is heated with an alkaline solu-

tion of o-nitrophenyl-propionic acid, cooled and shaken with chloroform. In the presence of sugar the chloroform becomes more or less blue. Clarification of the urine with lead acetate renders the test more delicate, and is necessary if  $H_2S$  or sulphides be present. Albumin, peptone, uric and hippuric acids, pigment, and various salts do not influence the reaction. Substances such as creatinine and glycuronic acid give the reaction if large quantities of urine be used. In consideration of this and other precautions, the author recommends the following method. The quantity of sugar present is roughly determined, and the urine is diluted with water according to the amount present. The author gives a table which shows how many drops of urine, containing from 0.2 to 5 Gm. of sugar in 100 c.c., are required to produce a violet colour. The reaction best obtained with a solution containing 0.3 Gm. o-nitrophenyl propionic acid in 100 c.c. 6 per cent. caustic soda solution.

**Verbascum Sinuatum, and Other Scrophulariaceous Plants, Active Principle of.** L. Rosenthal. (*Archiv.*, **134**, 57.) The active principle of the seeds of *Verbascum sinuatum*, which have been used in Greece as a fish poison since ancient times, is a saponin. It was obtained by extracting the half-ripe seeds with boiling alcohol. The alcoholic solution was evaporated, the residue dissolved in absolute alcohol, and the crude saponin precipitated with ether. The crude product was purified by solution in water, and evaporated to dryness; after addition of excess of  $MgO$  the dry residue was extracted with boiling alcohol, and again evaporated to dryness. This was treated with absolute alcohol, and saponin fractionally precipitated by addition of ether. The author considers this method the best for purification of saponin, and that it is adapted to its quantitative determination. The yield of saponin amounted to 6.13 per cent. calculated on the air-dried fruits. It is a white powder, which is more soluble in cold absolute alcohol than the other known saponins. No alkaloids were found in the fruits of *Verbascum sinuatum*, *V. phlomoides*, *V. thapsiforme*, nor in the seeds of *V. nigrum* and *thapsus*. Also no saponin was found in the fruits of *Paulownia imperialis*, *Gratiola officinalis*, *Antirrhinum majus*, or in the official *Flores verbasci*. A saponin-like substance was however isolated from the fruits of *Verbascum phlomoides* and *V. thapsiforme*.

**Vetiver Oil.** E. Theulier. (*Bull. Soc. Chim.*, **25**, 454.) The oil distilled in Grasse from dried roots is compared with that distilled from fresh roots in Réunion. The former had the fol-

lowing characters: Sp. gr. at 20°C., 1.0091;  $[a]_D = +35^\circ 10$  at 20°C. Total acid number, 44.4; free acid number, 32.48; ester number, 11.92. Réunion distilled oil had the sp. gr. 0.986;  $[a]_D = +28^\circ$ . Total acid number, 18.28; free acid number, 6.16; ester number, 12.12. The observed differences are attributed to the oxidation of certain constituents in the oil obtained from the dried roots. Fractional distillation indicated that the two oils contained the same ingredients, but in different proportions.

**Water, Pure, Distinctive Reaction for.** H. Causse. (*Comptes rend.*, **133**, 71.) A reagent is prepared by dissolving crystal violet (methyl-triamido-triphenyl-carbinol) 0.25 Gm. in a cold saturated solution of sulphurous acid, 250 c.c. 1 c.c. of this is added to 100 c.c. of the water to be tested in a stoppered flask. If the water be pure, the colour which is removed by the action of the  $SO_2$  on the crystal violet is restored; a violet tinge appears on the surface of the liquid, and gradually develops until the whole becomes violet. Contaminated water remains colourless. The reaction may be usefully applied, as a confirmative of Schiff's reagent para-diazo-benzene-sulphonate solution, which gives no reaction with pure water, but develops a colour with water contaminated with organic matter.

**Xylophia Ethiopica, Constituents of.** — Rochebrune. (*Pharm. Zeit.*, **46**, 693.) A new alkaloid anonaceine, crystallizing in long fine needles, has been isolated from the fruits of *Xylophia ethiopica*. The plant also yields a volatile oil having a cinnamon-like odour. In addition to being credited with aphrodisiac and anthelmintic properties, the ground fruit is used by the natives as a spice, and is at the same time employed as a counter-irritant.

**Yohimbine and Cocaine, Distinction Between.** Arnold and Behrens. (*Pharm. Centralt.*, **42**, 49.) The hydrochloride of yohimbine  $C_{22}H_{26}N_2O_3HCl$ , which has recently been introduced into medicine as an aphrodisiac, has certain properties in common with cocaine. A crystal of the salt placed on the tongue gives rise to a temporary anæsthesia, resembling somewhat that occasioned by cocaine hydrochloride. Arnold and Behrens give the following reactions for distinguishing the two: *Cocaine alkaloid* crystallizes readily in prisms permanent in the air, which melt at 98°C. *Yohimbine alkaloid* occurs in prismatic needles, which form with difficulty, are coloured yellowish on exposure to light, finally becoming orange red. They melt at 232°C. *Cocaine hydrochloride* melts at 183°C., *Yohimbine*

*hydrochloride* at 290°C. With a 1 per cent. solution of auric chloride the former salt gives a pale-yellow precipitate of microscopic needles, the latter an amorphous greyish-violet precipitate. *Cocaine* evolves an odour of methyl benzoate when heated for five minutes with sulphuric acid. *Yohimbine*, similarly treated, gives a faint peppermint-like odour. *Cocaine*, when treated first with fuming  $\text{HNO}_3$ , then with alcoholic KOH, gives no colour reaction. *Yohimbine* is coloured at first a deep green, then yellowish, by  $\text{HNO}_3$ ; on adding alcoholic KOH to this, a cherry-red tint is developed. *Cocaine* remains colourless when dissolved in strong  $\text{H}_2\text{SO}_4$ , and then treated with chlorinated lime; *Yohimbine* gives an intense orange-red colour. *Cocaine* causes the oxidation of  $\text{HgCl}_2$ , *Yohimbine* does not.

**Ylang Ylang Oil, Constituents of.** (t. Darzens. (*Bull. Soc. Chim.*, **27**, 83.) By saponifying ylang ylang oil with aqueous KOH, and distilling, methyl alcohol was detected in the aqueous distillate. On liberating the phenols from the saponification liquid by means of  $\text{CO}_2$ , and shaking with benzoyl chloride and caustic soda, the benzoyl compound of paracresol, melting at 70 to 71°C., was obtained. Acetic and benzoic acids were present among the products of saponification. Probably the paracresol is present in the oil as acetyl paracresol, which is stated to have the odour of ylang ylang.

(*Schimmel's Report*, Oct., 1901, 53, and April, 1902, 67.) Eugenol is one of the constituents of ylang ylang oil, in which it is accompanied by isoeugenol, which is recorded for the first time as a natural product. Creosol is present in the lower boiling fractions. The acids present as esters appear to be benzoic and salicylic. The benzoic acid is combined with methyl and benzyl alcohols. The last-named alcohol is also present in the free state. Von Soden and Rojahn also (*Berichte*, **34**, 2809) record the occurrence of this alcohol in the water of distillation of Manila ylang ylang.



## MATERIA MEDICA.

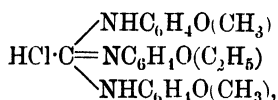




## PART II.

### MATERIA MEDICA.

**Acoine C. as a Local Anæsthetic.** (*Merck's Report, 1901, 38.*)  
Trolldenier has continued his researches on acoines, and confirms his previous statements that Acoine C, or hydrochloride of di-para-anisyl-mono-para-phenetyl-guanidine

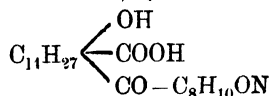


is best adapted for medicinal use. Its 1 per cent. aqueous solution acts as an effective anæsthetic on the eyes of rabbits, dogs and horses. Concentrations of from 1:80-1:60 are requisite to produce irritation. Hypodermic injections of 0.1 per cent. solutions induce a serviceable local anæsthesia of a longer duration than that produced by cocaine, or by other acoines. Since acoine is only slightly toxic, it may be used in relatively large doses. It is, moreover, a powerful disinfectant. The addition of only 0.02 per cent. of acoine to any nutrient medium suffices to inhibit the growth of spores of anthrax; 1 per cent. solutions remain, therefore, free from bacteria. Acoine was first used in medical practice by Darier for the anæsthesia of the eye. Recently A. Senn has employed it as a local anæsthetic in dental operations, especially in those cases where cocaine is contra-indicated, also in periodontitis, operations of fistulæ, and in all cases where it is desired to induce anæsthesia of the gums. For this purpose, 2 per cent. solutions are suitably mixed with 0.8 per cent. common salt. In veterinary practice Trolldenier has employed acoine for anæsthesia, by infiltration, in trephining operations in the frontal sinus and the antrum of Highmore in horses, in extirpations of papilloma of the nose, in neurotomy, etc. These injections are generally carried out by means of a 0.1 per cent. solution containing 0.8 per cent. sodium chloride.

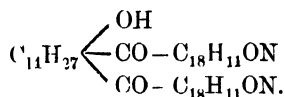
**Aconite Roots, Indian, Structure of the Various Commercial Varieties of.** A. Goris. (*Bull. des Sciences Pharm., 3, 103.*)

Detailed descriptions of the microscopic elements and macroscopic characters of the various Indian aconites, sold in the bazaars as *bish*, are given, accompanied by drawings, for which the original paper should be referred to.

**Agaric Acid Phenetidides.** J. R. Riedel. (*Pharm. Zeit.*, **47**, 210, after *Berichte*.) In order to combine the anhydrotic properties of agaric acid and the antipyretic action of para-phenetidine, condensation products of the two bodies have been prepared. By heating suitable molecular proportions of the two components to 140–160°C. in open vessels or in autoclaves, agaric acid monophenetidide



in almost colourless, soluble, micro-crystals containing water of crystallization and, when anhydrous, melting at 100°C.; or agaric acid diphenetidide



as a bluish-white crystalline powder, melting at 151°C., are obtained. If the condensation be effected in sealed tubes at 200°C. two other phenetidides are obtained. The monophenetidide obtained as above forms silver-grey brilliant leaflets melting at 69–70°C., and the diphenetidide in greenish-grey slender needles melting at 99–100°.

**Agurine. A New Diuretic.** Michaelis. (*Deutsch. Aerzt. Centr.*, through *Pharm. Zeit.*, **47**, 181.) This body, which is a combination of sodium-theobromine and sodium acetate, is stated to be preferable to diuretine and other similar preparations, since it is free from salicylic acid and appears to have a specific influence on the excretion of urinary phosphates. The daily dose is 3 to 8 grains, given in a capsule or in suspension with mucilage.

**Albargin in Gonorrhœa.** (*Merck's Report*, 1901, 40; see also *Year-Book*, 1901, 130.) Bornemann has obtained good results in the treatment of gonorrhœa with 0.2 per cent. injections of albargin, employed at first 4 or 5 times daily, afterwards twice a day. Albargin is not only cheaper than protargol, and more freely soluble in water, but is stated to be more easily dializable.

**Allamanda Cathartica** (*Amer. Drugg.*, **40**, 220, after *Formulaire des Medicaments Nouveaux*) is a plant of the family *Apocynaceæ*, indigenous to Guiana and Brazil. It contains a milky juice, and the parts used are the stem and the juice. In small doses it is

cathartic, in large quantities poisonous. The extract of the bark is recommended by Desportes as a hydragogue. The juice was used by Allamand, in order to combat the constipation of lead poisoning. The infusion of the leaves is a very good cathartic. The aqueous extract is used in doses of from 1 to 2 grains. The dose of the juice is 10 drops, and an infusion may be prepared with 1 part of the leaves to 100 parts of water.

**Aloes, Differentiation and Detection of.** E. Léger. (*Journ. Pharm. Chim.* [6], 15, 335.) *Detection of Aloes.* 50 Cgm. of the aloes is dissolved in 100 c.c. of hot water. After rapid cooling in a current of cold water, the resin which is thrown down is filtered out by the aid of a little talc. 20 c.c. of this filtrate is heated on the water bath to 80°C., when a few particles of sodium dioxide are added to the liquid. Simultaneously with the evolution of oxygen, the liquid becomes at first brown, then, on adding more dioxide, of a fine cherry-red colour.

*Distinction of Cape and Barbados Aloes.* 20 c.c. of the above filtrate is treated with 1 drop of saturated solution of cupric sulphate; the yellow colour is somewhat darkened; 1 Gm. of NaCl is then added, the flocculent precipitate thus formed being disregarded, since it is re-dissolved in the 10 c.c. of alcohol 90 per cent., which is next added. *Cape* and *Socotrine aloes* give a vinous red colour which gradually fades to a permanent yellow tint. *Barbados* and *Curaçoa aloes* give a bright cherry-red colour which persists for 12 hours. The first reaction is sensitive to a 1 per mille. dilution of the aloes. Since the colour is then feeble, it may be rendered more evident by acidulating the coloured solution with HCl and shaking out with ether. The ethereal solution, when shaken with alkali, gives a marked cherry-red colour.

*Detection of Aloes in Mixtures.* Since aloes is frequently prescribed associated with other drugs which contain oxy-methyl-anthraquinones, such as rhubarb, cascara, etc., these are best removed by the addition of a few drops of basic lead acetate solution. Aloins, in dilute solution, are only very slightly precipitated by this reagent, while the oxy-methyl-anthraquinones and their glucosides are completely thrown down. The above reactions are then applicable as described. Where only rhubarb is present with the aloes, alum and ammonia may be used as the precipitants, since rhubarb extract thus treated only gives the faintest peach tint with sodium dioxide. Incidentally it was found that tinctures containing aloes which had been stored for several years failed to give the reaction with sodium dioxide, thus confirming the state-

ment of Hirschsohn that these preparations are not stable and do not keep well. Tinctures and other liquid preparations of aloes should not, therefore, be kept long in stock. The pill is considered to be the best form for the medicinal administration of aloes.

**Aloes and Aloins.** E. Léger. (*Journ. Pharm. Chim.* [6], 15, 519.) The original method for extracting aloin from aloes is slightly modified, a mixture of chloroform 3 vols., and methyl alcohol 1 vol. being employed, 5 parts of the aloes being heated with 24 fluid parts of this solvent for 4 hours under a reflux condenser. The liquid is then allowed to settle, the clear liquid is decanted and the solvent distilled off on the water bath. The residue is taken up in absolute alcohol so as to form a syrupy liquid when cold; this is set aside in a cool place, preferably on ice, when the aloin will crystallize out in a few days. The author does not consider that the gradual formation of "hepatic" aloes is due to the crystallization of the aloin, but attributes the opacity to the presence of air or water.

*Cape aloes* give 5 to 6 per cent. of barbaloin free from isobarbaloin. *True Barbados aloes* of English commerce gave 5 per cent. of barbaloin and practically no isobarbaloin. On the other hand the so-called "Barbados" aloes of French commerce was found to be rich in isobarbaloin. It would appear, therefore, that the latter is derived from another botanical source. *Curaçoa aloes* is rich in aloins, yielding 10 per cent., half of which is barbaloin, the other half isobarbaloin. *Jafferabad aloes* is very rich in aloin, giving 20 per cent., chiefly isobarbaloin. *Socotrine aloes* contains only 4 per cent. of barbaloin with a little isobarbaloin. These aloins were separated from each other by fractional crystallization from methyl alcohol. Since barbaloin is found in all the known varieties of aloes, including Uganda aloes, in which it was detected by Tschirch and Klaverness, excepting only Natal aloes, which contains nataloin and homonataloin, it is suggested that the use of the prefix "barb" should be discontinued, as it is misleading.

**Amyloform in Nasal Catarrh.** Lepa. (*Pharm. Zeit.*, 47, 181.) A snuff, composed of equal parts of rice-starch and amyloform, used frequently for three or four days, is found to cut short an attack of nasal catarrh. It would probably be found useful in coryza.

**Anæsthesine.** Ritsert. (*Pharm. Journ.* [4], 14, 529, after (*Berlin Klin. Wochenschr.*) This name is given to the ethyl ester of *p*-amidobenzoic acid,  $C_6H_4 \begin{smallmatrix} \text{NH}_2 \\ \text{COOC}_2H_5 \end{smallmatrix}$ . It is a white, inodorous, tasteless powder, melting at  $89.5^\circ C.$ , sparingly soluble in

cold water, readily soluble in acetone, ether, benzene, chloroform, and in essential and fatty oils. The solutions do not alter even when exposed to light. Anæsthesine, relieves pain on a local application. C. v. Noorden has given it internally in doses of from  $4\frac{1}{2}$  to  $7\frac{1}{2}$  grains; twice daily, in affections of the stomach, also for relieving cough; and for irritation of the palate or throat, in the form of pastilles containing from  $\frac{1}{3}$  to  $\frac{1}{2}$  grain. Anæsthesine hydrochloride is soluble in 100 parts of water, and a solution of that strength can be used for injection, but causes an unpleasant burning sensation. A solution one-fourth the strength has been found to act as an anæsthetic. Dunbar recommends addition of sodium chloride and morphine in the following proportions: Anæsthesine hydrochloride, 0.25; sodium chloride, 0.15; morphine hydrochloride, 0.005 to 0.015; water, 100; the solution can be sterilized. Anæsthesine is not poisonous, and may be freely injected, as may be requisite, according to the extent of the part to be operated upon.

**Apiol, Crystalline.** J. Roussel. (*Merck's Report*, 1901, 42.) Crystalline apiol has been employed as a substitute for quinine in malaria, and also as a remedy for dysmenorrhœa. It may be advantageously administered as a hypodermic injection, in solution in olive oil, thus: Pure crystalline apiol, 60 grains; sterilized olive oil, q.s. to make  $5\frac{1}{2}$  fluid drachms; 1 c.c. or 17 minims (= 0.2 Gm. or 3 grains) to be injected once daily.

**Araucaria Rulei.** E. Heckel. *Répertoire* [3], 13, 241.) The gum resin of *Araucaria rulei* consists of 35 to 67 per cent. of resin and 18 to 64 per cent. of gum. The latter is readily soluble in hot water. The gum has a bitter, aromatic, terebinthinous taste. Three specimens were examined, one in large pieces, hard and brittle; another in a hard vermicular mass, resembling cherry-tree gum; the third in a thin cake of somewhat soft consistence.

**Aristoquinine.** H. Dreser. (*Pharm. Zeit.*, 47, 210.) This name has been given to diquinine-carbonic-acid ester, for which a place is claimed in medicine on account of its relative freedom from taste, as compared with other quinine salts. This is due to its slight solubility. It is stated to be readily absorbed, prompt and lasting in therapeutic action, and free from any disturbing influence on the digestive organs. Its toxicity towards protozoa is stated to be double that of quinine.

**Aspirin** (*Merck's Report*, 1901, 46.) The use of aspirin, acetylo-salicylic acid, as a substitute for salicylates, is gaining a more extended application. Moir reports favourably on its action

in cases of rheumatism complicated with heart affections; Ssaweljew has found it useful in pleurisy with effusion, while Nusch, finding that in these cases it acts merely as an analgesic, regards it as a specific in dry pleurisy. K. von Noorden has given it in diabetes mellitus in daily doses of 15 to 45 grains; Gottschalk finds it to be well supported by children, and Besançon and Paulesco have obtained good results in the treatment of chorea. For children the dose is 5 to 7.5 grains repeated three or four times daily, preferably in milk.

**Atlas Cedar Oil in Medicine.** Trabut. (*Bull. des Sciences Pharm.*, through *Schimmel's Report*, April, 1902, 14.) Further details of the treatment of gonorrhœa with Atlas cedar oil (*Year-Book*, 1901, 40) are supplied by Gmemy. Over 200 cases have been treated with most satisfactory results, the experimenter stating that Atlas cedar oil is preferable to sandal-wood oil in the treatment of these cases, being more efficient and not causing renal pain. The dose is 45 grains three times daily in capsules. H. Huertas confirms this favourable report. The oil has also been employed with success in the treatment of bronchitis and tuberculosis, for which it is given as a 5 per cent. solution in cod-liver oil, three tablespoonfuls being taken daily. In eczema it has been used as a 20 per cent. ointment with vaseline.

**Atoxyl.** (*Pharm. Zeit.*, 47, 211.) This name has been given to the anilide of met-arsenic acid on account of its relatively low toxic action, which is stated to be 40 to 50 times less than that of arsenic in the usually-employed inorganic forms. It is a white, crystalline, odourless and tasteless powder, readily soluble in water. It is administered in the form of hypodermic injections in doses of  $\frac{3}{4}$  to 3 grains.

**Blatta (Periplaneta) Orientalis as an Antispasmodic.** (*Merck's Report*, 1901, 166.) In addition to its well-established reputation as a diuretic, the tincture of *Periplaneta orientalis* is stated to be possessed of marked antispasmodic properties, which render it a valuable, if somewhat repulsive, remedy in pertussis. Beni Madhup Basu (*Med. Record*, 1901, 444) claims to have found it remarkably efficacious in doses of two drops in sweetened water, in whooping cough, effecting a cure where all other remedies had failed.

**Bromeigones.** E. Saalfeld. (*Therap. Monats.*, through *Merck's Report*, 1901, 51.) In addition to being valuable as general bromide substitutes, the bromeigones are now stated to be specially efficacious by internal administration, in alleviating the

itching attendant on many skin diseases, and also as a sedative in venereal diseases. In these latter cases tablets containing from 15 to 30 grains of insoluble bromeigone are given at night, at bedtime, or the water soluble pepto-bromide is prescribed in solution. In cutaneous affections about half the above dose is given three times daily. (See also *Year-Book*, 1901, 145.)

**Bromocol in Skin Diseases.** Joseph. (*Merck's Report*, 1901, 52.) In addition to its use as a nervous sedative when administered internally (*Year-Book*, 1900, 136) bromocol has been found to be particularly effective as an application, in the form of an ointment, for pruritus, in urticaria and in the itching generally accompanying skin diseases. It is employed as a 10 to 30 per cent. ointment with lanolin or resorbin.

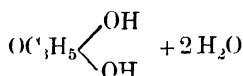
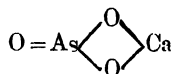
**Cajuput Oil in Winter Cough.** G. Foy. (*Med. Press*, 124, 292.) Cajuput oil, in 5 minim doses, is found to be a valuable remedy in winter cough, especially in elderly patients. It is also considered to be one of the best of all the stimulant expectorants. Its chief drawback is the taste, which many dislike. This is best masked by prescribing it with liquorice powder and honey, with chloroform water as a vehicle.

**Calumba Root, Adulterated, Ash Content of.** F. H. Alcock. (*Pharm. Journ.* [4], 12, 502.) The spurious nature of a specimen of calumba root was indicated by the large amount of ash—16·6 per cent. in one piece and 11·9 per cent. in another—left on incineration. The pieces of root were of markedly yellow colour, very porous, and without the characteristic yellow ring of true calumba. The adulterant was present to the extent of 25 per cent.

**Calystegia soldanella, Purgative Resin of.** L. Beulaygue. (*Répertoire* [3], 13, 393.) The plant is found to contain 0·94 per cent. of volatile oil, 1·63 per cent. of fat, and 12 per cent. of resin. The resin is most plentiful in the rhizome, from which it is extracted by means of alcohol, 90 per cent. After distilling off the greater part of the solvent, the residue is treated with water until precipitation commences, then purified with animal charcoal, and precipitated, after filtration, by pouring into a large volume of water. The precipitated resin is collected, dried, redissolved in alcohol and reprecipitated with water. It is then collected, dried, and washed with petroleum ether to remove the last traces of fat. It is finally dissolved in alcohol and evaporated to dryness. Thus obtained it is of an amber-yellow colour, soluble in alcohol, ether, chloroform, and acetic acid. It melts at 113°C. The solution in acetic acid is dextro-rotatory. It is an active purgative. Dilute

mineral acids hydrolyze it, indicating its glucosidal nature. It is suggested that it may prove a useful purgative, especially for children. The dose for adults, as a purgative, is 45 to 60 grains of the powdered root; of the resin 22 grains. For young children smaller doses, corresponding to the age, should be employed.

**Calcium Glycero-Arsenate.** (*Merck's Report*, 1901, 54.) This salt



occurs as a crumbling white powder, which is insoluble in water and alcohol, but is freely dissolved in mineral and organic acids, especially in dilute citric acid. It has given good results in the treatment of phthisis, in daily doses of  $\frac{1}{2}$  grain in the form of granules. It has also been employed in the form of subcutaneous injections, but when administered the results obtained were not so encouraging, since the injections are painful.

**Calcium Glycerophosphate in Enuresis.** Patin. (*Merck's Report*, 1901, 56.) In addition to its action as a nervine tonic, calcium glycerophosphate is stated to be a valuable remedy for incontinence of urine, both in children and in adults. The dose for the latter is 8 grains, for the former 4 to 6 grains morning and evening.

**Calcium Oxalate Crystals in the Study of Drugs.** H. Kraemer. (*Amer. Journ. Pharm.*, 73, 471.) The value of the observation of the form and dimensions of calcium oxalate crystals in the microscopic examination of drugs is dealt with. It is met with in drugs in monoclinic crystals of the following forms. (1) Rosette aggregates, or what are commonly termed rosette-shaped crystals. (2) Prisms, pyramids, and elongated or irregular hexagonal-shaped crystals. (3) Crystal-fibres. (4) Raphides. (5) Cryptocrystalline crystals. (6) Membrane crystals.

1. *Rosette aggregates* consist of numerous small prisms and pyramids, or hemihedral crystals more or less regularly arranged on a central crystal, and having the appearance of a rosette or star. The development of this form may be readily followed in the stem of *Datura stramonium* L. This form is more largely represented



in drugs than any, and the following is a list of drugs in which the crystals of this class are contained, together with the size of the crystals: *althæa*, 25 microns; *anisum*, 2-3 microns; *belladonna folia*, occasionally; *buchu*, 15-25 microns; *calendula*, 4 microns; *cannabis indica*, about 20 microns; *carum*, 0.5-1.0 microns; *caryophyllus*, 10-15 microns; *chimaphila*, 40-60 microns; *conium*, 1-2 microns; *coriandrum*, 3-7 microns; *cusso*, about 20 microns; *criodictyon*, 20-25 microns; *euonymus*, 15-20 microns; *fœniculum*, 1-2 microns; *frangula*, 5-20 microns; *geranium*, 45-70 microns; *gossypii radice cortex*, about 20 microns; *granatum*, about 15 microns; *humulus*, 10-15 microns; *jalapa*, 30-35 microns; *pilocarpus*, 20-30 microns; *pimenta*, 10 microns; occasionally 25 microns; *prunus virginiana*, 20-30 microns; *quercus alba*, 10-20 microns; *rhamnus purshiana*, 5-20 microns; *rheum*, 50-100 microns; *rubus*, 25-30 microns; *stillingia*, about 35 microns; *viburnum opulus*, occasionally; *viburnum prunifolium*, 15-35 microns.

2. *Monoclinic Prisms and Pyramids.* These are most frequently met with, next to the rosette crystals. They are frequently modified to form elongated or irregular hexagons. They are found in *calumba*, about 15 microns; *cardamom*, 10-15 microns; *coca*, 3-10 microns; *eucalyptus*, 15-25 microns; *gelsemium*, 15-30 microns; *granatum*, about 15 microns; *hamamelis*, 7-20 microns; *hyoscyamus*, about 10 microns; *krameria*, about 100 microns; *pimenta*, occasionally; *prunus virginiana*, 20-30 microns; *quassia*, about 25 microns; *quercus alba*, 10-20 microns; *quillaia*, 200 microns; *rhamnus frangula*, 5-20 microns; *rhamnus purshiana*, 5-20 microns; *senna*, 10-20 microns; *uva ursi*, 7-10 microns; *vanilla*, 7-35 microns; *viburnum opulus*, 15-30 microns; *viburnum prunifolium*, occasionally; *xanthoxylon*, 10-15 microns.

3. *Crystal fibres.* In many drugs a single monoclinic crystal occurs in each of the parenchymatous cells, adjoining the sclerenchyma fibres, and to this single longitudinal row the name crystal fibre has been given. They occur in the following, the size of the contained crystal being given: *calamus*, about 15 microns; *frangula*, 5-20 microns; *glycyrrhiza*, 15-20 microns; *hamamelis*, 7-20 microns; *hæmatoxylon*, 10-15 microns; *prunus virginiana*, 20-30 microns; *quercus alba*, 10-20 microns; *quillaia*, about 35 microns; *rhamnus purshiana*, 5-20 microns; *santalum rubrum*, 7-15 microns; *ulmus*, 10-25 microns; *uva ursi*, 7-10 microns.

4. *Raphides* was the name given by A. de Candolle to the

groups of needle-shaped crystals found in various plants. Usually the cells containing raphides are long, thin-walled and contain, sooner or later, a mucilage, which arises from the cell sap and behaves with reagents much like cherry-gum. The cells are either isolated or occur in groups placed end to end, as in *veratrum viride*, forming Hanstein's "raphidenführenden schlauchgefäße." Raphides are found in the following drugs, and of the length given with each: *belladonna folia*, occasionally; *cinnamomum*, about 5 microns; *convallaria*, about 45 microns; *cypripedium*, about 40 microns; *ipecacuanha*, 20-40 microns; *phytolacca radix*, about 30 microns; *sarsaparilla*, 6-8 microns; *scilla*, 0.1 to 1.0 mm. *vanilla*, about 400 microns; *veratrum viride*, about 45 microns.

5. *Cryptocrystalline crystals* of calcium oxalate are exceedingly small (about .2 to 10 microns in diameter) deltoid or arrow-shaped, and are so numerous as to entirely fill the parenchyma cells in which they occur, giving the cells a greyish-black appearance and readily distinguishing them from other plant cells. Vesque supposed that they were tetrahedrons and termed them "sable tétraédrique." The author considers them to be hemihedral forms of monoclinic prisms. They are found in *belladonna folia*, and *radix cinchona*, *phytolacca*, and *cassia*.

6. *Membrane crystals*. These are large monoclinic crystals surrounded by a membrane. They are found in the two official (U.S.P.) orange peels.

*Carbohydrate crystals*. These, which occur in *buchu*, *hedeoma*, *inula*, *lappa*, *pyrethrum*, *taraxacum* and *triticum*, are sometimes mistaken for calcium oxalate. They occur as spherocrystals or irregular aggregates which are more or less soluble in water.

Drugs which contain practically no calcium oxalate comprise: *aconitum*, *apocynum*, *arnica* flowers, *capsicum*, *chiretta*, *cimicifuga*, *colchicum* corn and seeds, *colocynthus*, *cubeba*, *digitalis*, *eupatorium*, *gentiana*, *grindelia*, *hydrastis*, *lappa*, *leptandra*, *linum*, *lobelia marrubium*, *mentha piperita*, *mentha viridis*, *mezerium*, *myristica*, *nux vomica*, *pareira*, *physostigma*, *piper*, *podophyllum*, *rhus glabra*, *rosa gallica*, *sabina*, *sanguinaria*, *santonica*, *sassafras*, *senega*, *serpentaria*, *sinapis alba*, *sinapis nigra*, *spigelia*, *staphisagria*, *strophanthus*, *sumbul*, *valeriana* and *zingiber*. The value of the study of the characteristic form, or absence of calcium oxalate crystals, is at once apparent when we consider the ease with which one can distinguish without question the Solanaceous leaves, belladonna root from inula, the genuine cinnamons, strophanthus seeds, and other drugs from those

that are spurious; as also true spigelia from an adulterant which contains calcium oxalate.

**Camphoric Acid in Cystitis.** (*Merck's Report, 1901, 28.*) Fürbringer has obtained excellent results in the treatment of cystitis with ammoniacal uric fermentation, which he treated by intravesical injection of a 2 per cent. aqueous solution of camphoric acid mixed with 11 per cent. of alcohol. Later on Bohland showed that, in the case of this ailment, internal administrations of camphoric acid (15 grains 3 times daily) in two days arrest ammoniacal uric fermentation, and relieve strangury, pain, and sometimes also cause the disappearance of leucocytes from the urine. The experiences of Bohland, which have hitherto met with little notice, have been recently confirmed by Petteruti, who, after treating several cases of catarrhal cystitis with salol douches and by the internal administration of salol, without success, secured a rapid cure by the internal administration of camphoric acid, in daily doses of 30 grains, which were taken at intervals of three hours during the night in subdivisions of 4 grains. Improvement was evident in two days, whilst the complete cure occupied from 5 to 15 days. When administered in the doses as indicated above, it gave rise to no undesirable symptoms.

**Cannabis Indica, Deterioration of by Keeping.** E. M. Holmes. (*Pharm. Journ.* [4], 14, 342.) In consequence of complaints received as to the quality of commercial Indian hemp in recent years, the author addressed an enquiry to Surgeon-Major D. Prun, Director of the Indian Botanical Survey, from whom the following reply was elicited: "There is, in theory, only one quality of ganjah. In practice, however, there are many sorts, depending on the place where the drug is produced and the way in which the plant is grown, and its age. Bengal ganjah is better than Bombay guaza, but the superiority is entirely due to the greater care of the Bengal cultivators, who carefully eradicate all the male plants from their fields. This prevents fertilization of the female plant, and the production of the resin is thereby greatly promoted. Moreover ganjah does not keep. The deterioration, physiologically, is so great that ganjah one year old has not more than one-fourth the potency of fresh ganjah, and ganjah two years old is practically inert. This fact is quite well understood among the traders in India as well as by the Government. One result of this fact is that as soon as a dealer's stock is two years old, he has to burn the whole of it in the presence of excise officials. From these facts it follows that all the traders have in the Government bonded

warehouses at a given time ganjah of two sorts, viz., ganjah a year old, and ganjah more than a year old. The native will not have any of the ganjah more than a year old if he can get the newer stuff. The English buyer seems to be ignorant of this, and the native dealer, finding his English customer prepared to take the older ganjah, naturally unloads his old stock on him. The complaint of the wholesale houses you refer to is the result. You enquire how the best ganjah is to be got by the trade. Of course it would be advisable to get it from Calcutta only, but here there is a difficulty, for since 1895 the Government has levied a duty on ganjah exported to London from Calcutta for *bona fide* medicinal purposes. This duty was previously levied only on ganjah used as a food accessory within Indian territory. This duty makes the price of Bengal ganjah prohibitive as compared with Bombay ganjah, on which, so far as I can learn, no such duty is levied when the drug is exported for pharmaceutical purposes to London or Paris. An application for a remission of the duty would probably result in the imposition of a corresponding duty by the Bombay Government, and would drive the English trade in this article out of India entirely. There is only one season of the year when it is wise to import ganjah, that is in April or May, just after the new crop has been harvested. But even then everything will depend upon the English agent being able to get the fresh drug. Unless the agent is careful, he may be saddled with ganjah of the previous year's harvest. If the trader is prepared to buy Bengal ganjah and pay the excise duty which Government levies on the article, he will get it, at that time of the year, without any trouble. The excise duty is something like 4s. per lb. of crude ganjah." In view of this deterioration by keeping, the author suggests that probably the full physiological action of the drug would be best obtained by making use of a tincture of fresh hemp for medicinal use.

**Cannabis Indica, Deterioration of, Cause of the.** C. W. Marshall. (*Pharm. Journ.*, 14, 362.) The author points out that the cause of the deterioration of *Cannabis indica* and its preparations is easily explained by the proneness of cannabinol, which is considered to be the active principle, to oxidation. Protected from access of atmospheric oxygen, cannabinol appears to retain its characters unaltered, but in superficial layers of cannabis indica and its preparations, it doubtless becomes oxidized, and thus rendered comparatively inert. To this is attributed the observed discrepancy in the therapeutic action of the drug.

**Cantharides, Assay of.** K. Dieterich. (*Pharm. Centralh.*, 42, 674.) The author considers that the official requirement of the Ph.G. IV.—that cantharides, when treated by Baudin's method, should yield 0·8 per cent. of cantharidin—is too high, and finds that the average yield of commercial Spanish flies is nearer 0·6 per cent. He also finds that *Mylabris cichorii* is richer in cantharidin, and that the active principle is extracted from it less contaminated with impurities than from cantharides. He therefore advocates the inclusion of “Chinese flies” as a source of the vesicant. The following results were obtained from the examination of commercial specimens. *Cantharides*: Ash, of whole beetles, 5·05 to 6·02 per cent.; of the powdered beetles, 5·23 to 7·47 per cent. Free cantharidin, 0·28 to 0·56 per cent.; combined cantharidin, 0·03 to 0·30 per cent.; total cantharidin, 0·38 to 0·85 per cent. Moisture, in whole beetles, 10·06 to 15·94 per cent.; in powdered beetles, 7·06 to 15·05 per cent. *Mylabris cichorii*: Ash of whole beetles, 3·98 to 5·01 per cent.; of powdered beetles, 4·16 to 5·10 per cent.: Free cantharidin, 0·67 to 1·01 per cent.; combined cantharidin, 0·135 to 0·95 per cent.; total cantharidin, 0·73 to 1·92 per cent. Moisture, in whole beetles, 10·42 to 12·54 per cent.; in powdered beetles, 7·53 to 11·64 per cent. Since cantharidin begins to sublime at 100°C., care must be exercised in the drying process or loss will result from volatilization. Copper was detected as a constituent of the ash of cantharides.

**Capsicum Fruits, the Ash of.** W. H. Lenton. (*Pharm. Journ.* [4], 12, 558.) The following table shows the amount of moisture and of ash in commercial capsicum fruits.

| Variety of Capsicum                                                              | Percentage<br>Loss on Drying<br>in Water Oven | Percentage<br>Ash on Air-dry<br>Drug |
|----------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------|
| 1. <i>Capsicum minimum</i> , bright Nyassa-land chillies . . . . .               | 8·4                                           | 4·7                                  |
| 2. <i>Capsicum minimum</i> , Sierra Leone. Good, nearly free from stalk. . . . . | 8·0                                           | 4·4                                  |
| 8. <i>Capsicum minimum</i> , bright Zanzibar . . . . .                           | 7·4                                           | 5·1                                  |
| 4. <i>Capsicum minimum</i> , dull, inferior Zanzibar . . . . .                   | 9·7                                           | 5·8                                  |
| 5. <i>Capsicum annuum</i> , average sample Bombay chillies . . . . .             | 9·4                                           | 5·4                                  |
| 6. <i>Capsicum annuum</i> , good sample, yellow Coconada . . . . .               | 9·1                                           | 5·0                                  |
| 7. <i>Capsicum annuum</i> , good average Bombay capsicums . . . . .              | 10·0                                          | 5·6                                  |
| 8. <i>Capsicum annuum</i> , dull, poor . . . . .                                 | 10·4                                          | 5·9                                  |
| 9. Japanese capsicums. Good average . . . . .                                    | 9·6                                           | 4·8                                  |

**Capsicum Minimum, Structure of the Fruits of.** T. E. Wallis. (*Pharm. Journ.* [4], **13**, 552.) The note is an exhaustive treatise on the microscopical characteristics of the fruits, illustrated by drawings. Not lending itself to abstraction, the original should be consulted.

**Carbolic Acid, Liquefied as an Antiseptic.** Von Bruns. (*Klin. Med. Woch.*, through *Merck's Report*, **1901**, 29.) According to the author, pure undiluted liquid carbolic acid, applied directly to the wound by means of a piece of gauze dipped in the acid, and left in contact with the suppurating surface for one minute, the wound being then washed out with alcohol, acts as a most powerful and effective antiseptic, surpassing sublimate, since its effect is more lasting, and at the same time causing no toxic action. It is not the strong liquid acid which is likely to cause phenol poisoning by absorption, but the weaker solutions generally employed. The strong acid, moreover, gives rise to no pain and no local lesions when applied in this manner.

**Carthamus Oxyantha Oil.** G. Watt and D. Hooper. (*Agricultural Ledger*, **1901**, 393.) The fixed oil of the seeds of the wild safflower, *Carthamus oxyantha*, is employed by the Afridis in the manufacture of the wax-cloth, which is a distinctive fabric used in the national costume, chiefly for the dresses of women. It is obtained either by expression, when it is known as "polli" oil, or by heat and draining. The latter form is known as "rogghan," and is used to keep leather pliable and as a lubricant for ropes, as well as for the manufacture of wax cloth. In some districts the cold expressed oil is converted into rogghan by prolonged gentle boiling over a fire. It is then thrown into cold water, when it acquires the requisite consistence of jelly.

It is a dark-brown adhesive substance, but does not stick to the previously wetted finger. When exposed to the air, it forms a leather-like pellicle in a few hours, and if the exposure be prolonged, it becomes more liquid. If the hot boiled oil be not thrown into water, it soon sets to the form of a hard leathery substance. It was accidentally discovered that rogghan forms an excellent cement for glass or stone ware. Experiments conducted with a view to the employment of rogghan as a waterproofing material have not given encouraging results, since the value of the oil appears to have been lessened by too long boiling. "Polli" oil, however, when cautiously boiled for about 4 hours, gives a product which renders cloth waterproof, and does not become sticky when

exposed to the heat of the tropical sun. The following were the constants given by the raw and boiled oil.

|                                    | Natural Oil. | Boiled Oil. |
|------------------------------------|--------------|-------------|
| Specific gravity, at 15°C. . . . . | ·9265        | ·9729       |
| Saponification value . . . . .     | 194          | 197         |
| Free fatty acids . . . . .         | 4·27         | 13·98       |
| Total fatty acids . . . . .        | 94·66        | 98·82       |
| Iodine value . . . . .             | 132·65       | 59·94       |
| Viscosity . . . . .                | 15           | 19,440      |

**Casimiroa Edulis.** (*Merck's Report*, 1901, 179.) The seeds of this Mexican plant, which have for centuries been known to possess medicinal value, and which are known in the vernacular as *Zabote sonifero*, *Zabote blanco*, *Chochitzapottl* and *Iztactzapottl*, will probably repay chemical and therapeutic investigation. Early in the seventeenth century Francisco Hernandez wrote that when eaten raw the fruit is fatal to man and animals. When roasted, however, and applied to wounds, it acts as a powerful antiseptic, and, taken internally, the kernel has a soporific effect. José Sanchez, in 1893, published an account of the chemical investigation of the seed, in which it is stated that the active principle is a crystalline body, probably an alkaloid, and that volatile oil, fat, gum, glucose, and starch are also present.

**Cassia Beareana, a Native Remedy for Blackwater Fever.** E. M. Holmes. (*Pharm. Journ.* [4], **13**, 616, and **14**, 42.) The root of a species of *Cassia*, at first supposed to be derived from *C. abbreviata*, but which, from subsequent examination of further material, was found to be a new species, which has been named *C. beareana*, from its discoverer, Dr. O'Sullivan Beare, is stated to be a specific for blackwater fever. Six or eight pieces of the root, an inch in length, are boiled in a gallon of water for 30 minutes. The patient, when thirsty, drinks a teacupful of the red-coloured decoction every three or four hours. The fluid extract of the root has also been successfully employed in a case of remittent bilious fever. Full botanical descriptions of the species, and drawings of the distinctive parts accompany the papers.

**Colchicum Corms and Seeds, Relative Alkaloidal value of.** L. Schultze. (*Amer. Journ. Pharm.*, **73**, 293.) *Colchicum* seeds are found to be markedly richer in alkaloid than the corms, the former yielding 0·9 per cent. of alkaloid, the latter 0·6 per cent. It is therefore unnecessary to retain both parts of the plant among the official drugs, and the seeds alone should be recognized as the source of galenical preparations. The alkaloid was determined

as follows:—100 Gm. of the powdered drug were placed in a flask, and 100 c.c. of Prolli's mixture added. This was macerated, with occasional shaking, for twelve hours. After decanting 50 c.c. of the clear fluid, it was evaporated on a water bath nearly to dryness. The residue was taken up with 10 c.c. of ether and 5 c.c. sulphuric acid (2.5 per cent.) added and stirred until the ether was evaporated. The acid fluid was then filtered into a separator, retaining the insoluble residue as much as possible in the beaker. This residue was redissolved in a little ether, and 2 c.c. of the dilute acid added, stirring as before, and filtering the acid aqueous solution into the separator. After washing the filter with a little of the acid, the washings were added to the contents of the separator and 15 c.c. of chloroform was shaken carefully with it during two minutes. It was then allowed to separate and the chloroform drawn off into a tared beaker. This treatment was continued with two portions of fresh chloroform (10 c.c. being used each time). The aqueous solution remaining after evaporating the chloroform was tested with Mayer's reagent, one-half strength solution being used, and, if the alkaloid had not been entirely removed, again treated with chloroform. Finally the chloroformic solutions were evaporated to dryness, redissolved in a little dilute alcohol and again dried to a constant weight. This residue was nearly pure colchicine. As it might have retained some chloroform, it was once more dissolved in dilute alcohol and dried.

**Copper Acetate in Anæmia.** (*Merck's Report, 1901, 67.*) Pure cupric acetate appears, according to V. Giudiceandrea, to be a valuable remedy in the treatment of anæmia and chlorosis, being more effective than iron, and not giving rise to any unpleasant secondary symptoms. Although the toxic action of copper salts appears to be somewhat exaggerated, care should be taken in its administration; the treatment should commence with a dose not exceeding  $\frac{1}{2}$  grain, which should be given on a full stomach after meals, and gradually increased, until a maximum daily dose of  $\frac{5}{8}$  grain is attained, which should be given in two doses after each of the principal meals. It may be prescribed in pilular form thus:—Pure neutral copper acetate, 8 grains; aqueous extract of valerian, 120 grains; powdered liquorice root, q.s. to make 100 pills. At first one pill is to be taken daily, gradually increasing the dose until five pills are taken twice a day.

**Copper Oxide as a Tonicide.** Doer. (*Merck's Report, 1901, 68, after Therap. der Gegenwart.*) Black oxide of copper is stated to be an efficient substitute for male fern extract, while it is far



less dangerous than that substance. It is prescribed as follows: Black oxide of copper, 90 grains; precipitated chalk, 30 grains; white bole, 180 grains; glycerin q.s. to mass. Divide into 120 pills, and roll in lycopodium. Dose: 2 pills four times a day, avoiding all acid food and drink. For children 2 pills are sufficient. After a course of these pills, a dose of castor-oil should be taken for several successive mornings.

**Crurin in Gonorrhœa.** E. Jacobi. (*Deut. Med. Woch.*, December 26, 1901.) Crurin is a rhodonate of quinoline and bismuth, and was so called by Joseph, on account of its action on ulcer of the leg. The original preparation contained starch, but that which is used for gonorrhœal injections does not. The formula is  $(C_9H_9NHSCN)_3Bi(SCN)_3$ . The rhodonates act as bactericides, and the bismuth salt as an astringent. The injection is prepared as follows: 15 grains of crurin is rubbed up briskly with 75 grains each of water and glycerin. Part of the salt is thus dissolved. Fresh water is slowly added, up to 7½ ozs., the mixture being well shaken. The resulting fluid is of a milky turbid nature, and has a nearly white precipitate settling at the bottom. The injection of 8 to 10 c.c. (135 to 155 minims) of this suspension is made twice or three times a day, and in certain cases is supplemented with a single daily injection of protargol solution. The treatment must be continued for some time after the last signs of discharge have disappeared, and gradually discontinued. In every case Jacobi considers it necessary to examine the discharge microscopically. He finds that crurin injections rapidly cause the gonococci to disappear, but it is not safe to leave off the treatment as soon as this is effected. The injections are much less tedious to carry out than those with protargol, and can be easily completed in three minutes. It is also valuable in gonorrhœal urethritis and cervicitis in the female. In this form of the disease he uses 10 per cent. bougies, made up with cacao butter.

**Cuprargol.** (*Merck's Report*, 1901, 66.) This is a cupronucleinic acid compound occurring as a dull, greyish-white powder. It dissolves slowly in water to the extent of 1:2. The solution is said to be very permanent. E. Emmert, who was the first to examine cuprargol clinically, describes it as a good antisecretory and antiphlogistic remedy. In ophthalmology it does good service as a means for treating conjunctivitis, by instilling 1 to 5 per cent. solutions once or several times daily, or by applying it in the form of compresses. The introduction of cuprargol having given rise to the view that it might be an

actual specific for the treatment of trachoma, W. Leitner undertook to examine it in this respect. He found, however, that the preparation did not by any means satisfy the expectations raised in the form of a 20 per cent. aqueous solution, and that it merely acts as an astringent.

**Dermosapol.** (*Merck's Report, 1901, 69.*) This is the commercial name of a superfatted balsamic cod-liver-oil soap recommended by Rohden. It consists of a mixture of 50 per cent. of perfumed cod-liver oil, Peruvian balsam, wool-fat, fat, glycerin and alkali, and possesses considerable absorptive power. Physiologically the preparation has the following properties: (1) It increases the alkalinity and capacity of oxidation of the lymphatic organs, which are impaired by certain diseases, such as scrofula and tuberculosis; (2) the cod-liver oil present exercises its characteristic influence upon the elements of the connective tissue, whilst the lymph becomes saturated with glycerin. These properties are accentuated by the admixture of specifics, such as potassium iodide, peruol, formaldehyde (5 per cent.), lysoform (10 per cent.), lysol, iodoform, mercury, etc. In glandular scrofulous processes, dermosapol with potassium iodide and formaldehyde exercises a particularly favourable influence; in lupus and psoriasis 10 per cent. lysoform-dermosapol, and in tuberculosis of the lungs dermosapol containing Peruvian balsam and medicated with 5 per cent. of potassium iodide has a beneficial effect. These preparations are applied in the form of inunctions two or three times daily, or as a protective dressing spread upon gauze. In all cases where local application is necessary, it is advisable to apply a general systematic inunction as well, one teaspoonful of dermosapol being rubbed into the chest, abdomen and back twice daily for about one minute. In gynæcology, Rohden has recently recommended dermosapol in the form of vaginal pessaries, in conjunction with 2.5 per cent. of potassium iodide, and 10 per cent. of lysoform for treating cervical erosions, in endometritis, in metritis, and specially in parametric and perimetric affections.

**Dionine.** (*Merck's Report, 1901, 70.*) The therapeutic application of dionine has, during the past year, been the subject of much attention. As a general sedative, especially in affections of the respiratory passages, it has been experimented with by Krijewski, O. v. Boltensstern, L. Gunzburg, H. Langes, A. Zirkelbach, B. Johnston, H. Hoff and A. v. Pezold, who describe it as a reliable antispasmodic and analgeic, Zirkelbach going so far as to characterize dionine as the best existing substitute for

morphine. A special advantage of dionine, which renders it particularly useful in irritation of the air passage, is that it promotes expectoration. In the treatment of children S. Gottschalk and R. Schmidt have secured excellent results from the use of dionine in pertussis, in which [it effects an immediate improvement in the spasmodic attacks; their frequency was diminished and the cough became looser. Schmidt's observation that dionine abbreviates the duration of the disease is negatived by Gottschalk. The latter recommends the following doses for children: For 1 year,  $\frac{1}{120}$  grain, at intervals of three hours; for 2 years,  $\frac{1}{60}$  grain; for 3 to 4 years,  $\frac{1}{40}$  to  $\frac{1}{20}$  grain; 5 to 8 years, up to  $\frac{1}{12}$  grain. It is not intended to induce sleep by these doses, and in the event of somnolence being produced the doses should be diminished. A suitable vehicle consists of sweetened almond oil emulsion, to which 30 to 45 grains of creosotal and 1 to 2 drops of peppermint oil may be added. Maëwski has employed dionine in the treatment of mental diseases; in these cases it is injected subcutaneously in doses of  $\frac{2}{3}$  to  $\frac{3}{4}$  grain. In morphinomania, dionine administered four times daily in doses of  $2\frac{1}{2}$  grains has proved most effective. Dionine is also widely used in ophthalmic surgery. As far as can be judged from the experiments hitherto made, its application is, generally speaking, indicated in corneal affections of all kinds, with the exception of those which are caused by conjunctival lesions, and in affections of the iris and the ciliary body. Particular importance however attaches to the action of dionine in hæmorrhagic glaucoma. Darier recommends the following formulæ for ophthalmic purposes: Dionine, 8 grains; distilled water, 150 m (for infiltration following cocainization). Dionine,  $1\frac{1}{2}$  grains; cocaine hydrochloride,  $1\frac{1}{2}$  grains; atropine sulphate,  $\frac{1}{3}$  to  $\frac{2}{3}$  grains; distilled water, 150 m (in iritis and iridocyclitis). In cases where it is desired to induce contraction of the pupil this formula should be modified by replacing atropine by pilocarpine sulphate,  $\frac{1}{2}$  to  $1\frac{1}{2}$  grains; or eserine sulphate,  $\frac{1}{3}$  to  $\frac{2}{3}$  grains. Dionine,  $1\frac{1}{2}$  grains; cocaine hydrochloride,  $1\frac{1}{2}$  grains; sodium chloride, 3 grains; solution mercury cyanide, 150 m. 1 to 2 drops to be instilled 5 to 6 times per day (in corneal wounds and infiltrations in mild keratitis parenchymatosa). Pilocarpine hydrochloride,  $\frac{1}{4}$  grain; eserine sulphate,  $\frac{1}{3}$  grain; dionine,  $1\frac{1}{2}$  grains; distilled water, 150 m. One drop to be instilled five to six times daily (in glaucoma).

**Disodic - Methyl - Arsenate** (Arrhenal) in **Paludian Fevers**. Armand Gautier. (*Comptes rend.*, 134, 329.) This salt

$\text{Na}_2\text{As}(\text{CH}_3)_2\text{O}_3$ , which is closely related to sodium cacodylate  $\text{NaAs}(\text{CH}_3)_2\text{O}_2$ , has been employed with marked success in the treatment of tropical paludian fevers. The salt is remarkably non-toxic, considering the amount of arsenic in the molecule, the normal dose by hypodermic injection being  $\frac{3}{4}$  to  $1\frac{1}{2}$  grains. Cures were effected in nine cases treated with one, two, or rarely three injections, each of  $\frac{3}{4}$  grain of the salt. Some of these cases had proved resistant to quinine.

"Doua" or "Haneh." Pasteveau. (*Journ. Pharm. Chim.* [6], 15, 227.) In consequence of the numerous cases of poisoning which followed the use of this drug, sold in the Arabian bazaar district of El Oued, a seizure of the article was directed by the authorities, and it was submitted to analysis. It occurs in the form of a white crystalline mixture, which was found to consist of 95.4 per cent of santonin and 4, per cent. of magnesium sulphate.

**Drugs, Powdered Ash of** L. Glaser. (*Pharm. Zeit.*, 46, 691, 887.) The author has, in many instances, compared the results of incinerating commercial powdered drugs, with those powdered in the pharmacy, or, in some instances, with those collected, dried, and powdered by himself.

**LEAVES.**—*Belladonna*.—Commercial, 14.6 per cent.; self-gathered, whole leaves, 11.12 per cent. *Coca*.—Commercial, 5.3 per cent.; powdered in pharmacy, 8.1 per cent.; self-powdered, 6.0 per cent. *Digitalis*.—Commercial, 8.8 per cent.; powdered in pharmacy, 7.0 per cent. *Eucalyptus*.—Commercial, 7.7 per cent. *Coltsfoot*.—Commercial, 41.7 per cent.; powdered in pharmacy, 17.9 per cent.; self-powdered, 18.1 per cent.; self-gathered whole leaves, 17.6 per cent. *Jaborandi*.—Commercial, 7.1 per cent. *Walnut*.—Self-powdered, 7.5 per cent. *Marshmallow*.—Commercial, 18.5 per cent.; self-powdered, 17.6 per cent. *Balm*.—Self-powdered, 11.7 per cent. *Peppermint*.—Commercial, 18.5 per cent.; powdered in pharmacy, 11.4 per cent. *Tobacco*.—Self-powdered, 20.2 per cent. *Patchouli*.—Commercial, 22.2 per cent.; self-powdered, 15.7 per cent. *Rosemary*.—Commercial, 6.7 per cent. *Sage*.—Commercial, 45.7 per cent. and 18.5 per cent.; powdered in pharmacy, 9.5 per cent.; self-gathered whole leaves, 9.4 per cent. *Senna (Alexandrian)*.—Commercial, 11.5 per cent.; the same "without resin," 11.6 per cent. *Senna (Tinnevely)*.—Commercial, 11.9 per cent. and 11.1 per cent.; powdered in pharmacy, 9.9 per cent. *Stramonium*.—Commercial, 21.3 per cent.; self-gathered whole leaves,

13·8 per cent. *Clover*.—Commercial, 8·2 per cent.; *Uvæ ursi*.—Powdered in pharmacy, 2·4 per cent.

**FLOWERS AND FRUITS.**—*Convallaria flowers*, 8·4 and 11·0; *Cassia buds*, 4·5 and 4·4; *Chamomile*, 9·8 and 8·7; whole, 9·8; *Chrysanthemum*, 6·5 and 7·6; *Santonica*, 10·0 and 11·4; whole, 6·6; *Saffron*, 4·8 and 5·2; whole, 4·6; *Couso*, 23·2 and 19·3; whole, 6·8; *Lavender flowers*, 6·6 and 11·5; whole, 6·6; *Insect flowers*, 8·8; *Rose petals*, 4·2 and 7·6; whole, 4·5; *Dill fruits*, 9·2 and 7·5; whole, 8·0; *Star anise*, 3·2 to 3·5; whole, 2·9; *Anise (Pimpinella)*, 8·0 and 10·1; whole, 7·8; *Oranges, immature*, 5·5 to 7·1; whole, 6·5; *Capsicum annuum*, 5·4 and 4·8; whole, 6·8; *Ceylon cardamoms*, 11·4 and 12·2; whole, 10·8; *Malabar cardamoms*, 5·2 and 10·3; whole, 6·7; *Caraways*, 8·2 and 9·7; whole, 5·6; *Colocynth*, 8·8 and 5·9; whole, 11·4; *Conium fruits*, 7·4; whole, 4·6; *Coriander*, 6·1 and 6·7; whole, 5·6; *Fennel*, 7·9 and 10·5; whole, 7·2; *Juniper*, 3·3 and 4·9; whole, 3·2; *Laurel berries*, 1·5 and 1·6; whole, 1·6; *Phellandrium fruits*, 8·5 and 10·1; whole, 7·7; *Sabadilla*, oil free, 9·0 and 6·7; whole, with oil, 6·9; *Syzygium jambolanum*, 2·1 and 2·8; whole, 1·9; *Anomum*, 4·0 and 3·5; whole, 3·5; *Carduum marie*, 5·9 to 6·1; *Colchicum seeds*, 3·6 and 3·9; whole, 3·0; *Colocynth seeds*, 5·1 to 5·3; whole, 2·3; *Eruca*, oil free, 6·4; with oil, 4·7; whole, with oil, 6·4; *Fenugreek*, 5·0 and 5·2; whole, 3·3; *Hyoscyamus seeds*, oil free, 8·0 and 8·5; whole, with oil, 4·9; *Rice*, 0·5; whole, 4·2; *Black mustard*, oil free, 7·7; and with oil, 5·5; whole, with oil, 4·2; *Stavesacre*, oil free, 21·5 and 22·3; whole, with oil, 10·2; *Strophanthus kombé*, with oil, 5·9; oil free, 9·1; whole, with oil, 4·3; *Strophanthus hispidus*, with oil, 5·9; oil free, 9·1; whole, with oil, 3·8; *Strychnos nux-vomica*, without epidermis, 1·5; whole, 1·0; *Strychnos nux-vomica*, with epidermis, 2·5 and 1·6; whole, 1·1.

**Epicarin.** E. Winkler. (*Monats. f. ltr. Prakt. Derm.*, through *Murck's Report*, 1901, 75.) Epicarin is a useful remedy in seborrhœa capitis, for which it is prescribed in the following alcoholic solution: Epicarin, 5; ether, 15; brandy, 80 parts, by weight. A small quantity of this is rubbed with the finger into the scalp. It is not necessary to remove the grease from the hair before making the application. For inflamed and ulcerated chilblains the following ointment has been recommended: Epicarin, 6; soft soap, 1; casein ointment, 60. To be applied once daily after bathing with warm water and carefully drying. The itching of lichen planus may be completely cured by the application of the above epicarin spirit with inunctions of the ointment.

**Eucaïne Acetate.** P. Cohn. (*Merck's Report, 1901, 78.*) Eucaïne acetate has been successfully employed instead of  $\beta$ -eucaïne hydrochloride, which it exceeds in solubility, for producing anæsthesia in minor operations of ophthalmic surgery, such as removal of foreign bodies, electric cautery of corneal ulcers and pterygia. 4 to 5 drops of a 2 per cent. aqueous solution produced complete anæsthesia in 3 minutes, which persisted for 10 to 15 minutes.

**Formaldehyde, Recent Medicinal Employment of.** (*Merck's Report, 1901, 84.*) Jezdik has treated whooping cough with formaldehyde vapour, which he causes to be inhaled after vaporization in one of the usual formaldehyde lamps. A space of 20 cubic metres (700 cubic feet) requires a tablet of formaldehyde, and the patients, including children, should be left in such a room filled with formaldehyde vapour for 15 to 20 minutes. Savoire has treated chronic pharyngitis by two daily irrigations of the nasal cavity with 1 per cent. phenosalyl solution followed by the inhalation of the following mixture:—Formaldehyde, 1; menthol, 20; gomenol, 20; chloroform, 20; eau de Cologne, 200 parts, by weight (1 table spoonful per inhalation). A. Bronner has obtained favourable results from the local treatment of laryngeal papilloma with formaldehyde spray. Angina, especially angina follicularis, is treated by Jordan with a 2 per cent. solution of formaldehyde in glycerin, with which he paints the affected tonsils. Sycosis is likewise curable by rubbing the parts, after careful cleansing, with a 4 per cent. solution of formaldehyde in glycerin and subsequently covering the infected portions with a compress moistened with the solution. According to Demidoff and Soloviev, favus may be healed by the application of compresses dipped into a 5–10 per cent. formaldehyde solution. Similarly, H. Loeb reports on the healing power of 5–10–15 per cent. formaldehyde solutions in certain affections bearing the character of acne, as well as in alopecia areata. Mangnat describes formaldehyde, when applied in the form of the following solution, as one of the best remedies for mosquito bites: Formaldehyde 40 per cent., 5; alcohol 90 per cent.; distilled water of each, 10.0.

Opinions differ considerably with regard to the efficacy of igazol inhalations in tuberculosis. Whilst K. Hoffner and Wolff did not observe any benefit whatever from the use of the remedy, excellent results have been recorded by K. Beerwald, M. Ehrenfeld, and J. Preisich. Igazol has found its competitor in a substance called "*Formazol*," which is a mixture of 80 per cent. of formaldehyde

with small proportions of iodoform, chloral hydrate, terpene and menthol, and which has the advantage of being considerably cheaper. Karl treats the night sweats of phthisical patients by vigorously rubbing the entire trunk with a 5–10 per cent. formaldehyde soap before retiring, lathering with a dry cloth, and finally drying.

The fact that formaldehyde is a good hardening agent for gelatin probably accounts for an observation by H. S. van 't Hoff that it raises the melting point of nutrient gelatines. The addition of only one drop of 40 per cent. formaldehyde to 10 Gm. of gelatin yielded a nutrient gelatin which remained solid even in boiling water. B. Galli-Valerio recommends formaldehyde vapour for killing the foul brood of bees. The vapours are generated in a specially constructed apparatus and made to exercise their influence gradually so as not to endanger the lives of the bees by too rapid and powerful action.

Of new preparations having formaldehyde as their base, Ianoform dusting powder, which is a mixture of talcum, freshly precipitated zinc oxide, starch powder and a combination of wool-fat and formaldehyde, may be mentioned.

**Gallianin.** (*Merck's Report*, 1901, 88.) Gallianin is the commercial name of a fluid consisting of 4 parts by volume of ozone dissolved in 1 part of an indifferent vehicle.

Gallianin was introduced into veterinary surgery by Pichard and Cotty, and is said to have asserted its efficacy in infectious and acute pneumonia, congestion of the lungs, influenza, bronchial catarrh, typhoid, emphysema, sun-stroke, asphyxia by intoxication, etc. The preparation is injected into the jugular vein once daily, the dose being 80 to 320 m for horses, 1 fl. oz. for cattle, 16 to 48 m for dogs. Properly employed, the injections are perfectly free from danger and are said to produce a certain and rapid cure.

**Garlic in Tuberculosis and Lupus.** W. C. Minchin. (*Med. Press*, 124, 592.) According to the author, garlic juice is a valuable remedy in the treatment of pulmonary tuberculosis, being efficient in nearly all incipient, and even in some advanced cases. About fifty cases have been treated, in the majority of which excellent results have been obtained, so that the treatment is regarded as of the utmost value. The freshly-expressed juice is employed without removing the chlorophyll, and is given in doses of 20 minims. It is also employed, diluted with water, in the Burney-Yeo respirator, which is worn constantly for the first

few weeks, after which it is used for about three hours daily. Laryngeal cases are treated with a spray of a 1 in 20 solution. For lupus and surgical tuberculosis the fresh undiluted juice is applied direct.

**Geranium Nepalense and G. Wallichianum.** D. Hooper. (*Agricultural Ledger*, 1901, 97.) The roots of *Geranium nepalense* from two different sources gave :—

|                          | Kashmir. | Sabaraupur. |
|--------------------------|----------|-------------|
| Tannin . . . . .         | 13.58    | 10.82       |
| Geranium-red . . . . .   | 7.85     | 3.81        |
| Fat . . . . .            | .78      | .54         |
| Sugar, gum, etc. . . . . | 13.69    | 9.40        |
| Starch, etc. . . . .     | 9.90     | 32.28       |
| Crude fibre . . . . .    | 9.80     | 19.42       |
| Ash . . . . .            | 4.35     | 12.20       |
| Moisture . . . . .       | 10.10    | 12.00       |
|                          | 100.00   | 100.00      |

It is stated in *Pharmacographia Indica* that this root affords abundance of red colouring matter and is used like alkanet (*Onosma echioides*) for colouring oil; but the above roots on being tested were found to possess no such property.

*G. wallichianum*, which is stated to be used by the natives as a dye, has been found by the author to contain :—

|                          |       |
|--------------------------|-------|
| Tannin . . . . .         | 32.00 |
| Geranium-red . . . . .   | 7.49  |
| Fat . . . . .            | .54   |
| Sugar, gum, etc. . . . . | 14.15 |
| Starch, etc. . . . .     | 14.56 |
| Fibre . . . . .          | 12.41 |
| Ash . . . . .            | 4.70  |
| Water . . . . .          | 14.15 |

These roots closely approach, both in chemical constituents and in structure, the roots of *G. nepalense* from Kashmir. It is suggested that they would prove useful astringents both in medicine and in the arts.

**Gluton.** (*Brit. Med. Journ. Epit.* [1], 1902, 31.) The value of gelatin as a nutrient substance has been recognized for some time, and its action is known to depend upon its albuminoid constitution. The chief objection to its use is that it cannot be



taken in large quantities. To overcome this difficulty H. Brat (*Deut. Med. Woch.*, Jan. 9, 1902) allowed acids to act for some hours on gelatin at a high temperature, the resulting mixture was then neutralized, and, lastly, evaporated to dryness. A whitish-yellow powder was thus obtained, which was called "gluton." It appears to be easily soluble in water, and does not become gelatinous even in concentrated solution. It can be taken with other articles of diet, or in the form of drinks with lemon juice and sugar, etc., either cold or warm. A solution of gluton differs from that of gelatin by its reaction with alcohol and with platinum chloride. Brat found that gluton is sufficiently nutritious to replace albuminous foods, such as meat, and also carbohydrates. He details the metabolic changes of some patients fed partly with gluton, which clearly show its value as a food. He claims that it has the highest nitrogen value of the modern chemical foods, and at the same time it has a very small "ash" value. It is easily digestible, can be taken in large quantities, and has the same nourishing value as gelatin.

**Glyconic Acid in Diabetic Coma.** L. Schwarz. (*Prag. Med. Woch.*, 1901, 361, through *Merck's Report*, 1901, 36.) The author considers that on two occasions the administration of 1 to 2 ounces, by mouth and as an enema, dissolved in solution of sodium bicarbonate, has saved the life of a diabetic patient, who, however, succumbed to a third attack, because a further supply of glyconic acid was not available.

**Glycosal.** (*L'Union Pharm.*, 43, 156.) Glycosal is the glycerin ester of monosalicylic acid. It is a white crystalline powder melting at 76°C., soluble in 100 of cold water, and but slightly soluble in alcohol. It mixes well with glycerin and is partially saponified by alkalis and alkaline carbonates. It exercises all the antiseptic and antirheumatic properties of salicylic acid and its salts, without, it is stated, disturbing the digestive organs, or causing tinnitus.

**Hamamelin, Commercial.** T. S. Barrie. (*Pharm. Journ.* [4], 12, 231.) From an examination of commercial hamamelin it is concluded that the drug is met with in two forms—dry extracts of the leaves and of the bark.

The former are, to judge from the analytical data, made with strong alcohol, the alcoholic solution being mixed with a variable proportion of powdered hamamelis leaves and the whole evaporated to dryness. A certain proportion of extraneous mineral matter is sometimes added.

The latter seem to be made from the bark by means of dilute alcohol. They do not keep well, owing to hygroscopic substances being extracted at the same time, but they are richer in tannin than the green extracts. In all the samples examined in this group, mineral matter was added to overcome their hygroscopic properties.

One sample examined differed considerably from the other brown extracts. Its organic matter was completely soluble in absolute alcohol, and almost completely soluble in boiling water, the little insoluble matter being readily dissolved by weak spirit, and further, exposed to the air for a month, it remained as pulverulent as ever. These properties, taken along with its high tannic acid content, point either to its being a specially treated extract of witch hazel, or to its not being a preparation of that bark at all.

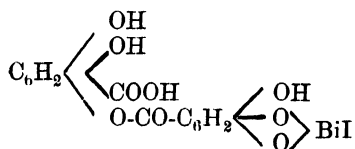
**Hetoform.** O. Dokkum. (*Oester. Zeits. f. Pharm.*, **55**, 139.) This name has been given to bismuth cinnamate,  $\text{Bi}(\text{C}_9\text{H}_7\text{O}_2)_3 \cdot \text{Bi}_2\text{O}_3$ . It is prepared by precipitating bismuth nitrate solutions with sodium cinnamate. It forms a white insoluble powder with a faint odour of cinnamic acid.

**Hetol in Phthisis.** (*Brit. Med. Journ. Epit.* [1], **1902**, 28.) E. Franck (*Therap. Monats.*) discusses the value of hetol as a remedy for pulmonary tuberculosis. He recounts at some length the reports of Landerer, Ewald and others. His own cases number 13. Of these, 5 were complicated (tuberculous laryngitis, etc.), and did not improve at all, while 6 showed "maintained improvement," and 2 are classified under "improvement." It may be stated some of the cases were still under treatment in the current year. Most of them were sent to sanatoria as a supplement to the treatment. In one the injections of hetol wrought a rapid change for the better. In another the signs and symptoms appear to have been very slight, and no report of bacilli in the sputum is mentioned. Besides the hetol and open-air treatment at Davos, some iron-tropon was used. In a third case no bacilli were found in the sputum. The other cases appear to have been more severe. He concludes by stating: (1) Hetol treatment offers a great and well-founded prospect of improvement and cure in early, uncomplicated cases; and (2) the treatment should be combined with, or followed by, a sanatorium treatment. He believes that open air and overfeeding is not sufficient to cure even uncomplicated phthisis.

**Hydrastin, Resinoid.** Lewis Ough. (*Chem. and Drugg.*, **59**, 153.) For the preparation of the resinoid hydrastin, the coarsely-

powdered rhizome is thoroughly damped with spirit (sp. gr. 0·828), packed in a percolator, and allowed to macerate for about forty-eight hours, then slowly extracted with more spirit till thoroughly exhausted, about 2 gals. of spirit being required for each pound of root taken. The bulk of the spirit is recovered from the alcoholic tincture by distillation, and the remainder driven off at a low temperature. The resinoid thus obtained is of a darkish-brown colour, and readily reduced to a fine powder in a dry, warm atmosphere. The average yield is 11 per cent.

**Ibit.** (*Merck's Report*, 1901, 106.) Ibit is a compound of tannin and bismuthic oxyiodide represented by the formula



It is a fine, greenish-grey, odourless and tasteless powder, which, in time, acquires a brownish tint if exposed to the action of sunlight. Ibit is insoluble in ordinary solvents and parts with some of its iodine in the presence of water or organic matter. Ibit, or bismuth oxyiodotannate, is recommended by C. Brunner and C. Mayer in the place of iodoform as a dry antiseptic, being equal to airol or bismuth oxyiodogallate. Ibit ganze keeps well and may be sterilized by steaming.

**Ichthargan.** (*Merck's Report*, 1901, 109.) Ichthargan appears to be gaining ground on account of its absorbent, antiphlogistic and bactericidal properties. A 0·1 to 0·25 per 1000 aqueous solution has given good results when used as an injection for gonorrhœa; bougies containing 1 or 2 grains of it have been employed for the same disease. Cystitis is cured by irrigations with 0·3 to 0·5 per 1000 solutions. Unna finds that it has marked keratoplastic properties, 1 to 5 per cent. ichthargan dusting powders causing healing of obstinate crural ulcers. It has also been used with success in trachoma in the form of 0·5 to 3 per cent. solution. In veterinary practice a 10 per cent. ichthargan ointment is found to be generally serviceable for wounds. Distemper in dogs has been cured with the following mixture: Ichthargan, gum acacia of each 5; distilled water, 100. Dose: a teaspoonful 3 times daily. It has also been useful in the treatment of influenza in horses, and as an antiseptic vaginal douch for cattle.

**Ichthoform in Veterinary Practice.** BASS. (*Merck's Report*, 1901, 110.) In gastric catarrh of dogs, and in the diarrhoea of distemper, ichthoform in doses of 45 grains has given good results. Diarrhoea in horses also yielded to doses of 4 to 5 drachms of ichthoform, a smaller dose, 75 grains, being given to foals. It is also valuable in croupous enteritis of cattle, in the diarrhoea of calves, full-grown cattle being given 4 to five drachms; calves, 75 grains. Dusting with ichthoform rapidly cures malanders, and a 10 per cent. ointment is useful as a general healing application to wounds.

**Iodocol.** (*Merck's Report*, 1901, 116.) This name is given by Cattani to a mixture of iodine and guaiacol, which has been successfully administered in doses of 3 to 6 grains 4-5 times daily in the treatment of tuberculosis of the lungs, tuberculous and chronic bronchitis, croupous pneumonia with retarded resolution, and the catarrhal stage of bronchial asthma. Even after use extending over several weeks, it is found to be well tolerated. It is readily absorbed and excreted both through the urinary and respiratory organs. The expectoration is diminished and rendered fluid by the use of iodocol, and, though it may not exercise a direct and demonstrable healing effect upon the tuberculous lesion, yet there is no doubt that the condition of the patients is markedly improved during its administration.

**Iodoline.** (*Brit. Med. Journ. Epit.* [1], 1902, 91.) Jordan (*Monats. für Prakt. Derm.*, 1901 [3], 610) thus reports on iodoline, another substitute for iodides or iodoform. Iodoline is a yellow powder, insoluble in water and alcohol, consisting of a compound of iodol and albumin. There are two forms, one for internal use, containing 9 to 10 per cent. iodol, another for external use, containing 36 per cent. iodol. The latter form, although useful externally, was found, when given internally, to cause iodism. The author, therefore, uses it one-third the strength for internal use. He has employed it in tertiary syphilis in doses of 30 grains given in water or milk; six to ten doses daily were given, representing 15 to 30 grains of iodine. As a rule the drug was well borne, but sometimes temporary iodism and digestive troubles occurred. Iodine appeared in the urine in two or three hours. When used externally no iodine appeared in the urine. Iodoline acted well in penicillitis; but, to succeed in tertiary and malignant cases of syphilis, doses of 180 to 300 grains a day must be given. The chief advantage of the drug is said to be the improvement in the general condition. Externally it acts well in gummata, syphilides

and soft chancre. In such cases it should, in the author's opinion, replace iodoform.

**Ko-Sam, Constituents and Therapeutic Value of.** (*Merck's Report, 1901, 177.*) E. Heckel and F. Schladenhauffen have identified this drug, which is held in high esteem by the Chinese as a remedy for dysentery, as being produced by *Brucea sumatrana* of the N.O. Simarubaceæ. In addition to a considerable amount of oil, the seeds are found to contain quassin, a saponin, and another bitter principle, not identical with quassin. Bertrand and Physalix consider that the active principle is a glucoside, which they have named kosamin. This was found to be toxic, the lethal dose being 0.25 Gm. per kilo. when given by intravenous injection, or twice as much when administered by the mouth. Mougeot has reported that, having administered the drug in 879 cases of tropical dysentery, 799 recovered in 3 to 6 days, 57 more in 14 days; and there were only 8 complete failures. Cocnacq reports similar success in the treatment of recent acute dysentery, as well as in chronic non-inveterate cases. The usual dose is 12 seeds on the first day of treatment, 10 on the second, 8 on the third. Since the fat-containing seeds are likely to induce emesis, it is better to administer the fat-free seeds, of which the dose is half the above-named quantity.

**Lactanin.** (*Pharm. Post, 35, 136.*) This recent addition to the number of bismuth intestinal remedies is stated to be the dilacto-mono-tannate. It occurs as a yellow, tasteless, odourless, insoluble powder, which is best dispensed suspended in syrup of mucilage, thus: Lactanin, 2 to 3; syrup of gum acacia, 40 parts. Three to 5 teaspoonfuls of this to be taken daily. It is stated to be useful in the treatment of diarrhœa, acute and chronic enteritis, tuberculous affections of the bowels, and in other intestinal complaints.

**Lactic Acid in Alopecia.** (*Brit. Med. Journ. Epit. [2], 1901, 92.*) Balzer (*Journ. des Pratic.*) recommends the following treatment for alopecia. After cutting the hair short and washing with soap, the following lotion is applied: Mercury perchloride,  $\frac{1}{2}$  part; acetic acid, 1 part; alcohol, 100 parts; ether and alcoholic solution of lavender, of each 50 parts. After drying, the head is rubbed with lactic acid, about 30 per cent.

**Lamium album as a Hæmostatic.** (*Pharm. Post, 35, 207.*) The white dead nettle has been held in high esteem in domestic medicine as a hæmostatic. The tincture of the flowers, in doses

of 40 drops every two hours, in water, has been found effective in arresting hæmorrhage in metritis and other uterine affections.

**Lecithin and Cod-liver Oil for Rickets.** (G. Carrière. (*Comptes rend.*, **134**, 858.) Pale cod-liver oil, containing 0.5 per cent. of lecithin from egg, has been found to give excellent results in the experimental treatment of 5 typical cases of rickets in infants from 14 to 19 months old. The dose administered was from 1 to 4 tablespoonfuls *per diem*, according to age. Improvement was very marked after the first month of treatment, and was progressively maintained until, after from four to six months, the course of the disease seemed to be arrested in each case, and the patient cured.

**Liquorice Root and Extract of Liquorice. Glycyrrhizic Acid in.** D. B. Dott. (*Pharm. Journ.* [4], **14**, 239.) Fifty Gm. of powdered liquorice root was macerated with cold water and percolated with the same solvent during several days, till apparently quite extracted. The glycyrrhizic acid was then estimated by a slight modification of Hafner's method (*Year-Book*, **1900**, 194.) It does not seem desirable to digest a glucoside with dilute sulphuric acid, otherwise the process is Hafner's. The weak waters were concentrated to a small bulk and mixed with excess of dilute sulphuric acid. The precipitate was treated with warm alcohol and the insoluble matter washed with the same. The filtrate, rendered alkaline with ammonia diluted with water, was evaporated, made up to 100 c.c. with water and a little ammonia, again filtered and dilute sulphuric acid added. The precipitate so obtained was collected, washed with 3 per cent. sulphuric acid, and dried in a desiccator. It was then extracted with acetone, to which solution, water and excess of barium carbonate were added. When the acetone was evaporated the residue was digested with 200 c.c. of hot water, the filtered solution evaporated, and the residue dried at 100°C and weighed. The barium compound was reckoned as containing 81.24 per cent. of glycyrrhizic acid. The barium salt weighed 4.30 Gm. = 3.49 glycyrrhizic acid = 6.98 per cent. in the root. Twenty Gm. of the same powdered root was then extracted by water, following exactly the official process, and the glycyrrhizic acid estimated as above. The barium compound weighed 0.96 Gm. = 0.779 glycyrrhizic acid = 3.89 per cent. This would indicate about 15 per cent. of glycyrrhizin in the official extract, if none were rejected by subsequent filtration; while by rational modifications usually adopted the percentage of glycyrrhizin must be still greater

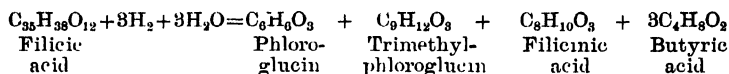
**Lithium Salolo-phosphate.** Zechel. (*Pharm. Post*, **35**, 136.) This compound, which is also known under the name of *Salvosal-lithium*, is stated to be a valuable remedy in influenza and similar febrile affections, as well as a powerful antarthritic and diuretic. It is given in doses of 4 grains three to four times daily.

**Lysulphol.** (*Brit. Med. Journ. Epit.* [2], **1901**, 84.) In the November number of the *Therap. Monats.* E. Rumpf recommends the use of a soluble preparation of sulphur, which bears the name of lysulphol. It is a 10 per cent. combination of sulphur and soap, with cresolin added, and appears in semi-fluid form as thick, black substance. The preparation is rubbed into the affected part every evening and washed off in the morning, and on tender skins it can be diluted with equal parts of glycerin. In pityriasis versicolor, scabies, acne, desquamatory conditions, at times in old cases of psoriasis and of prurigo, he has found it of considerable value.

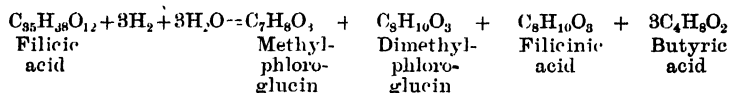
**Magnesium Cacodylate.** Burlureaux. (*Presse Médicale*, **1901**, 149, through *Merck's Report*, **1901**, 34.) Burlureaux describes magnesium cacodylate, in addition to sodium cacodylate, as well adapted for subcutaneous injection, since it is freely soluble and contains a considerable proportion, 48 per cent., of arsenic. Ten per cent. and 25 per cent. solutions are appropriately used, the treatment being commenced by injecting  $\frac{1}{2}$  c.c. of the 10 per cent. solution, and if this dose is taken without evil consequences, it should be raised to 1 c.c., after which the treatment should be concluded with the 25 per cent. solution. The action of the magnesium salt seems to be analogous to that of sodium cacodylate, and never produces objectionable secondary effects, even when administered in large doses.

**Male Fern Extract, Constituents of.** Boehm. (*Liebig's Annalen*, **307**, 249; and **318**, 230.) In 1896 the author isolated the following crystalline constituents from liquid extract of male fern, Flavaspidic acid, alaspidine, and aspidinol. He has since isolated filicinylbutanone, and has investigated the long-known filicic acid and its decomposition product, filicinic acid. *Filicic acid*  $C_{35}H_{38}O_{12}$  or  $C_{35}H_{40}O_{12}$ . This is generally considered to be the active principle of male fern. To isolate it male fern extract is massed with sufficient magnesia to produce a pulverulent mixture. The powder thus obtained is suspended in a large volume of water. The mixture is allowed to settle, the clear supernatant portion is decanted, and the precipitate washed with further quantities of water as long as the liquid is coloured. Excess of  $H_2SO_4$  is then added to

the bulked aqueous liquid, a copious precipitate is formed, which is washed, collected, and dried over  $\text{H}_2\text{SO}_4$ . This is crude filicic acid or *filicin*. This is purified by extraction with acetone, from solution in which the pure acid is deposited in crystals. These are further purified by solution and crystallization from acetic ether. About 3.5 per cent. is the average yield. It melts at  $184\text{--}185^\circ\text{C}$ ., and is very sparingly soluble in boiling alcohol and in ether; its best solvents are chloroform and carbon disulphide. By prolonged boiling with alcohol it undergoes decomposition; the greater part of the bodies formed are amorphous resins, but one, albaspidin, is crystalline. This has been previously isolated by the author from male fern extract. Filicic acid dissolves in carbonates without liberating  $\text{CO}_2$ . It is decomposed in alkaline solution by zinc dust, giving butyric and filicinic acids, with filicinybutanone as an intermediate product, phloroglucin and its homologues, and a little acetone as shown by the equations—



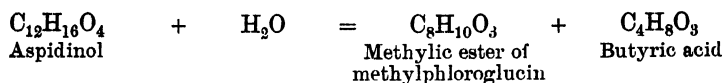
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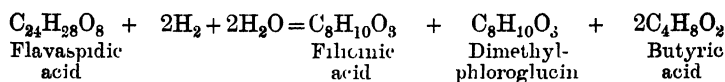
*Aspidinol*,  $\text{C}_{12}\text{H}_{16}\text{O}_4$ , is found in the ethereal extracts of *Aspidium spinulosum* and *A. filix femina*, as well as in that of *A. filix mas*. It is isolated from the aqueous mother liquor after removing the filicic acid, as described above, by saturating it with  $\text{Na}_2\text{CO}_3$ , evaporating, and extracting with ether. The ethereal solvent is distilled off and the residue dissolved in water. This aqueous solution is treated with  $\text{CuCl}_2$ , which precipitates the aspidinol in the form of a reddish-yellow powder, while flavaspidic acid remains in solution. This precipitate is collected, washed with water, dried, and extracted with boiling petroleum benzene, which dissolves it. It is purified by recrystallization from ligroin, then from xylene, and finally from benzene. It melts at  $156\text{--}161^\circ\text{C}$ ., and has the formula  $\text{C}_{12}\text{H}_{16}\text{O}_4$ . It is soluble in alkaline solutions, but only with difficulty in solutions of alkaline carbonates; it is removed from the latter by shaking out with ether. It is soluble in water.  $\text{Fe}_2\text{Cl}_6$  colours its solutions dark green. With zinc dust, on prolonged digestion in alkaline solution, it is decomposed



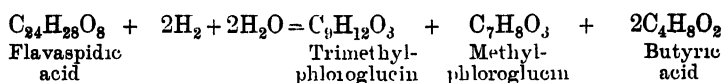
quantitatively into the methyl ester of methyl-phloroglucin and butyric acid according to the equation—



*Flavaspidic Acid*,  $\text{C}_{24}\text{H}_{28}\text{O}_8$  or  $\text{C}_{24}\text{H}_{30}\text{O}_8$ , is also found in the ethereal extracts of other species of *Aspidium*, besides *A. filix mas*. It is extracted as a lime salt from the mother liquor in which it is soluble, after precipitating the aspidinol. It is liberated by treatment with HCl and shaking out with ether. It is purified by recrystallization from alcohol or benzene. It forms lemon-yellow tablets or prisms; when crystallized from ethyl or methyl alcohol it puffs and melts at  $92^\circ\text{C}$ ., then again solidifies and remelts at  $156^\circ\text{C}$ . When crystallized from benzene, xylene, or acetic acid, it does not melt below  $156^\circ\text{C}$ . The former is named  $\beta$ -flavaspidic acid. The acid decomposes carbonates, liberating  $\text{CO}_2$ , giving amorphous salts soluble in water. By zinc dust in alkaline solution it is reduced to butyric acid, filicinic acid, filicinylbutanone, and methyl-, dimethyl-, and trimethyl-phloroglucins, according to the equations—



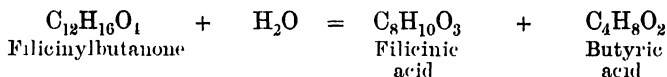
and



*Albaspidin*,  $\text{C}_{25}\text{H}_{18}\text{O}_8$ . This is obtained from the mother liquor after separating the above-mentioned bodies by the addition of alcohol. After setting aside for some weeks, a crystalline deposit of albaspidin is formed, which is collected, washed with methyl alcohol containing a little chloroform, dried, and recrystallized, first from acetone, and finally from alcohol. It crystallizes in silky, colourless needles melting at  $148^\circ\text{C}$ . It is soluble in alkalis, but not in alkaline carbonates. It has been obtained synthetically by the action of formaldehyde on methylene-difilicinylbutanone. It is also formed by the decomposition of filicic acid on prolonged boiling with alcohol.

*Filicinylbutanone*,  $\text{C}_{12}\text{H}_{16}\text{O}_4$ . This is a constant constituent of male fern extract. It is obtained by decomposing filicic or flavas-

pidic acid with zinc dust in alkaline solution, from which it is deposited on cooling. It is purified by recrystallization from xylene, when it forms large, anhydrous, rhombic tablets, melting at 95°C. If it be crystallized by precipitating its acetone solution with water, it occurs in hydrated, rhombic, pearly scales, melting at 65°C. By prolonged heating with NaOH and zinc dust on the water bath it is decomposed into filicinic and butyric acids.



All these bodies act more or less energetically as vermifuges. Filicinylbutanone, combined with phloroglucin or its homologues, has a more marked tænicide action than when in the free state, the compound with methylphloroglucin being specially active. If, however, the butyric acid radicle be eliminated or converted into filicinic acid, the body becomes inert.

*Filicinic Acid*,  $\text{C}_8\text{H}_{10}\text{O}_3$ . This is obtained, as shown above, by the decomposition of filicic or flavaspidic acids. It crystallizes in colourless cubes or octahedra melting at 212–215°C. It decomposes carbonates, reacts on litmus, and is not removed from alkaline solutions by shaking out with ether. It is not, however, a true acid, and does not contain a carboxyl group.

**Menthorol.** Lequedi. (*Therap. Monats.*, **16**, 17.) Although parachlorophenol has given good results in the treatment of tubercular affections of the larynx and upper air passages, the author finds that its objectionable taste and odour soon render it insupportable by patients. He overcomes this difficulty by combining it with menthol, and with this new compound, which he has called menthorol, has obtained excellent results. It is applied locally, as a paint, by means of a camel's hair pencil, being used in the form of a 5, 10, or 15 per cent. solution in glycerin.

**Mercury Cacodylate.** Brocq. (*Rev. de Therap.*, **1901**, 537, through *Merck's Report*.) This salt appears to be but little adapted for medicinal use, since it is very poisonous and its injections give rise to considerable pain. Brocq substitutes for it a solution containing per c.c., 47 milligrammes of iodide of mercury and 4 Cgm. of sodic cacodylate. This solution he injects in doses of 1–2 c.c. It causes very little pain, provided the injections are not made too superficially, neither does it give rise to induration. The beneficial effect of the injection is noticeable in the cases of neurasthenia and of debilitated syphilitic patients in the secondary and

tertiary stages, in which it frequently surpasses in efficacy the ordinary mercurial treatment.

**Mercury Iodocacodylate.** Ciavette and Fraisse (*Pharm. Post*, 35, 99) have obtained good results in the treatment of syphilis by means of hypodermic injections of mercury iodocacodylate, which is prepared thus:—Mercury cacodylate 1, and cacodylic acid 2, are dissolved in distilled water 75; a solution of sodium iodide in water 3, is added, the mixture neutralized with dilute soda solution and made up to 100. In four weeks from 18 to 20 injections, each of 1 or 2 c.c., are given.

**Mercury Oxycyanide.** Genouville. (*Merck's Report*, 1901, 105.) Gonorrhœa has been successfully treated with injections of mercury oxycyanide. At first a 1:5000 aqueous solution is employed, the strength of which is gradually increased until a potency of 1:1000 is reached, if it be tolerated. It has given good results in cases in which permanganate gave rise to irritation.

**Mountain Ash Berries as an Aperient.** Krupetsky. (*Merck's Report*, 1901, 82.) The fluid extract of the berries of *Pyrus aucuparia* in doses ranging from 20 m. to 4 fluid drachms, taken twice or thrice daily, has been found to be a pleasant and most effectual remedy for constipation arising from various causes. It is specially useful in obstinate chronic cases, and is suitable for administration to children. The dose should be taken about two hours after the principal meals.

**Muira-Puama.** (*Merck's Report*, 1901, 172.) This drug has been minutely investigated by T. Peckolt, according to whom it contains a crystalline substance of the nature of an alkaloid, muirapuamine, besides an amorphous bitter substance, some fat, and two resin acids.

Muira-puama is highly esteemed by the natives of Brazil as an aphrodisiac, and is also employed in concentrated decoctions for locally bathing the genital organs. The infusion (1:16) is administered in tablespoonful doses in the treatment of dysentery, menstrual colic, etc. A tincture (1:5) prepared by means of alcohol of sp. gr. 0.847 is administered in doses of 5 to 8 drops three times daily, in paralysis and rheumatism. This tincture may be applied concurrently in the form of frictions. In cases of impotence, 10–16 drops should be administered three times daily, and local applications, containing 4 fl. ozs. of muira-puama tincture, in 21 fl. ozs. of water should be prescribed twice daily. The fluid extract should be ordered in doses of 10–20 drops, to be taken

three times daily. An antidyseptic and tonic is obtained in the form of a wine, of which a small tumblerful should be taken at each meal. This wine is prepared according to the following formula:—Alcoholic extract of muira-puama, 60 grains; dissolve in alcohol 90 per cent.,  $6\frac{3}{4}$  fl. drs.; add sherry,  $32\frac{1}{2}$  fl. ozs.

**Myrrh, the Official Test for.** H. G. Greenish. (*Pharm. Journ.* [4], 12, 666.) The official test for myrrh, that "when moistened with nitric acid it assumes a violet colour," is not considered satisfactory. Better results are obtained when the residue of a petroleum ether or ethereal solution of the oleoresin is exposed to the vapour of nitric acid. It is suggested that the official test should be amended as follows:—Half a Gm. of coarsely-powdered myrrh, occasionally shaken during ten minutes, with 10 c.c. of ether, should afford a filtrate, 2 c.c. of which should yield, when evaporated, a residue that is slowly coloured violet by contact with the vapour of nitric acid.

A finer violet colour reaction is obtained from the residue of petroleum ether, but since that solvent is not so likely to be at hand, pure, in the pharmacy, ether is substituted for it. The author does not agree with Hauke that bissabol gives with  $\text{HNO}_3$  a similar colour reaction to myrrh. On the contrary, it is found to assume first a yellow, and finally a brown tint. All samples of bissabol examined afforded positive evidence when tested with Tucholka's bissabol test. This consists in mixing 6 drops of a petroleum ether extract with 3 c.c. of glacial acetic acid, and cautiously introducing a layer of concentrated sulphuric acid; the acetic acid solution assumes a rose-pink colour.

The nitric acid test above described is found to be more convenient than, and as effective as, the bromine test of Flueckiger and Hanbury and its modifications.

The volatile oil of myrrh is found to give the colour reaction very markedly, but the resin was not obtained in a state of sufficient purity to allow it to be tested.

**Nandhiroba or Naandhiroba** (*Amer. Drugg.*, 40, 220, after *Formulaire des Medicaments nouveaux*) is the seed of *Fovillea cordifolia*, *N. O. Cucurbitaceæ*, a native of Brazil, the Antilles and Guiana. The seeds contain fixed oil, resin, bitter principle, mucilage and sugar. Their physiological action is purgative, febrifuge, vermifuge and emetic. According to R. Brown these seeds antagonize the action of a snake venom, and may be used both externally and internally for this purpose. The seeds are also considered to be antidotes for a variety of vegetable poisons,

e.g., *nux vomica*, *rhys toxicodendron*, etc. The remedy can only be of use in a case of poisoning if administered very promptly. An emulsion is prepared from the seeds.

**Narcissus pseudo-Narcissus as an Emetic.** Huchard. (*L'Union Pharm.*, 42, 538.) An infusion of the flowers of the common daffodil is said to be a safe and useful emetic. Three parts of the flowers are infused in 250 parts of hot water for twenty minutes. The dose of this infusion, which should be given hot, is 45 minims for children and 80 minims for adults. The remedy was formerly much used, but has fallen into undeserved neglect.

**Nicotine Salicylate.** (*Merck's Report*, 1901, 133.) Nicotine salicylate, which was recommended by Wolters in 1898, under the appellation "Eudermol" as a remedy for the treatment of scabies in man has been used most successfully by L. C. Fettich in the form of a 1 per cent. lanoline ointment for the treatment of mange in dogs. He has cured 8 out of 9 dogs affected with sarcoptic mange, whilst of those suffering from acaritic mange 50 per cent. were cured. In the latter case, the treatment with eudermol ointment should be assisted by baths containing 2 per cent. of creolin or 2 to 4 per cent. of potassium sulphide. In the opinion of Fettich the preparation combines the excellent antiparasitic properties of tobacco with those of salicylic acid, and has the advantage of not staining the hair, and of eliminating the risk of nicotine poisoning.

**Nux Vomica Seeds, Occurrence of Copper in.** J Rutherford Hill. (*Pharm. Journ.* [4], 14, 348.) In reply to D. Hooper, who has stated (*Pharm. Journ.* [4], 11, 525) that he is unable to detect the presence of copper in Mysore *nux vomica* fruits, the author reiterates his statement (*Year-Book*, 1900, 142), proving its presence in the seeds of fresh fruits imported from Calcutta. After incineration, the ash of two seeds dissolved in dilute  $H_2SO_4$  contained sufficient copper to give a distinct coat of that metal to a piece of fine, bright iron wire, and also a blue tint with excess of ammonia.

**Oenanthe Crocata.** E. M. Holmes. (*Pharm. Journ.* [4], 14, 431.) A recent case of fatal poisoning has again called attention to the virulent toxic properties of this common plant. Figures of the plant accompany the note and numerous cases of fatal poisoning from eating the parsnip-like tubercles are cited. It is suggested, that local authorities should take steps, where the plant is abundant, to eradicate it. Attention is called to the fact that although the roots are so toxic, nothing is known as to the chemical nature of the active principle, except that it is said not to be an

alkaloid. The matter is evidently one deserving of investigation.

**Oleic Acid for Hepatic Colic.** S. Artault de Vevet. (*Merck's Report*, 1901, 37.) Oleic acid, in capsules, each containing 15 grains, is recommended as a remedy for hepatic colic instead of olive oil which, to be effective, has to be given in nauseatingly large doses. During an attack, an analgesic, such as antipyrine, may accompany the dose of oleic acid, which should be given morning and evening. As a prophylactic, one dose of  $7\frac{1}{2}$  to 15 grains taken in the morning, on an empty stomach, for 10 successive days, is enough. When the incidence of an attack can be foretold, it may be prevented by this treatment 15 days previously.

**Olutkombul.** (*Merck's Report*, 1901, 180.) This is the glutinous sap of the bark of *Abroma angustum*, a Bittneriaceous plant growing in India. In 1872 B. M. Sircar first drew attention to the therapeutic properties of the juice of olutkombul, which he praised as an excellent emmenagogue in menstrual irregularities. Recently he has published a report on his observations, extending over 30 years, stating it to be an absolutely certain remedy in cases of congestive and neuralgic dysmenorrhœa or in mixed forms of this affection, while it fails in mechanical disturbances and organic lesions of the uterus. In the event of the pains manifesting themselves before the commencement of the menses, olutkombul should be administered 2 days before their expected appearance, 3 days during their course, and 2 days after their cessation. In the absence of premonitory pains the remedy is administered from the first day of the hæmorrhage and its use continued for 7 days. A single dose of 30 grains suffices generally to remove the trouble.

**Opium, Assay of.** W. Stoeder. (*Pharm. Centralh.*, 42, 518, after *Pharm. Weekblad.*) The drug operated on should be previously dried at 50°C., not 60°C., as required by the Ph. G. IV. Thus dried, it should yield to water not less than 50 per cent. of its weight of dry extractive, and should give at least 10 per cent. of morphine when assayed by the following process. 3 Gm. of the dry powder is mixed with calcium hydrate, 0.5 Gm., and water, 10 Gm., more water being added to bring the total weight to 32 Gm. The mixture is allowed to macerate for two hours with frequent agitation, then 20 Gm. is filtered off, equivalent to 2 Gm. of the original powder. To this filtrate, ether, 10 c.c., and benzol, 5 drops, are added, and the whole well mixed by agitation; ammonium chloride, 0.2 Gm., is then added, and the mixture well shaken frequently at intervals for an hour. The ethereal layer is then

withdrawn and replaced by another 10 c.c. of that solvent, the mixture being again frequently shaken. This ether is removed, the precipitated morphine collected and washed with water until a drop of the washings no longer colours phenol-phthalein solution. The morphine is then dissolved in 20 c.c. of N/10  $H_2SO_4$  solution, the filter being washed until quite free from alkaloid and acid, and the free acid titrated back with N/40 alkali, using hæmatoxylin as the indicator. From the amount of acid, combined with the morphine, the amount of anhydrous alkaloid is calculated from the molecular weight 285 for anhydrous morphine. *Extract of Opium* is assayed by taking 1.5 Gm. of the extract, rubbing down with 0.5 Gm. of calcium hydrate and 10 c.c. of water, adjusting the total weight to 30.5 Gm.; allowing to stand for two hours with frequent agitation, then filtering off 20 Gm. (equivalent to 1 Gm. of extract) and treating as described under opium. It should contain 18 per cent. of morphine. *Tincture of Opium*. 15 Gm. of the tincture is evaporated on the water bath to 5 Gm. With this calcium hydrate 0.25 Gm. is mixed and sufficient water to make up the weight to 15.25 Gm. After frequent shaking for two hours, 10 Gm. of filtrate is collected. This is then treated in the same manner as described for the extract, using, however, half quantities of the reagents and solvents.

**Otto of Roses, Pure.** E. M. Holmes. (*Pharm. Journ.* [4] 12.) J. C. Sawyer has recently sent to the Museum of the Pharmaceutical Society a specimen of rose otto which he believes to be absolutely pure, which was presented at his request by the firm of Slavi Mitow et Cie., of Kezanlik, in Bulgaria. Mitow maintains that mountain air and climate influence the delicacy of the odour, and finds that the oil distilled from roses grown at the foot of the Balkans is of a greyer and less yellow tint, and of a more delicate fragrance than that obtained from plantations at a lower elevation. He attributes the difference in the quality of the otto partly to climate and partly to the fact that, whereas he has specially constructed stills of English make, and uses flowers obtained from plantations in the most favourable localities, others may not be able to use similar stills nor to grow the roses under such suitable conditions.

That there is some influence in climate and in soil will not be doubted by any one who has cultivated roses. The more richly manured the soil, and the moister the atmosphere in summer, the finer are the roses. The conditions under which most roses flourish are a rich, slightly calcareous, but not heavy loam, preferably on a

slope, so as not to permit of water becoming stagnant at the roots, shelter from dry east winds, and an altitude where the atmosphere is warm but showery in June and July. If these conditions are obtained the crop is abundant, especially if weak branches are pruned off in early spring. There is no doubt also that the application of scientific methods may increase not only the quality but the quantity of the product.

The presence of a definite percentage of stearoptene and the temperature at which it solidifies have been considered to be a test of the genuineness of the oil, but the stearoptene can be easily made to cover adulteration. Living plants of the roses, said to have been cultivated in Germany from plants obtained in the rose districts of Bulgaria, have proved to be *Rosa alba*, a white rose with comparatively little odour; the other, presumably a red rose, has not flowered, the climate of Kent being apparently not warm enough. The plant may be *Rosa damascena*, but it grows taller than that plant usually does in this country. Blondel describes the Kezanlik plant as a branching form of *Rosa damascena*, nearly identical with the old Rose de Puteaux. The fact of the white rose having but little odour led the author to make inquiries why it is used in Bulgaria as a boundary line on plantations of the red rose, and whether the flowers are mixed with the latter in distillation, and, if so, why. The answer to these inquiries was that the white rose yields more stearoptene, and affords a means of giving that crystalline appearance to otto of rose which is considered so good a criterion of its genuine character and freedom from adulteration. It is obvious, therefore, that in unscrupulous hands an excess of white rose flowers might be made to cover the addition of geraniol or of Turkish oil of geranium. The chemical examination of the oil has shown that the stearoptene is absolutely free from odour when pure. There are, it is said, two stearoptenes in Bulgarian otto of rose, but whether one is that of the red and the other that of the white rose has not been ascertained. But it is clear that the more of the odourless stearoptene the otto contains the less real perfume it can possess.

It appears that although only 1 per cent. of phenylethyl alcohol is present in the otto after distillation, a very much larger proportion is present in the perfume of the rose, since von Soden and Rojahn found 25 per cent. in "rose pure," a product obtained by L. Pillet from fresh flowers by treating them with a volatile solvent, and 45 per cent. in the essential oil obtained from rose pomade, phenylethyl alcohol being readily soluble in water. This shows that



distilled rose water is different from a water made from the otto, and if phenylethyl alcohol has any antiseptic property the rose water obtained during the distillation of the flowers would be preferable for eye lotions. It should be noted that French otto of roses is obtained from a different species, viz., a slightly double form of *Rosa centifolia*, very different from the bulky cabbage rose of English gardens, and that the otto is not identical in odour with Bulgarian otto of rose. This otto, prepared at Nice, Grasse and Cannes, is eagerly purchased by the wholesale perfumers in Paris, and apparently by a few in England who understand the difference in odour, chiefly, for the "white rose" perfume. Any one who will compare the odour of the flower of the cabbage rose, the hybrid perpetual rose "General Jacqueminot," the damask rose, the Maréchal Niel, the Austrian briar, and the sweetbriar, will recognize that different roses have different perfumes, and if the odour of the fresh damask rose be compared with the Bulgarian otto it will be found that the two are not absolutely identical, even if the otto be absolutely pure. There is probably another factor which modifies the odour of the otto. In Kezanlık and elsewhere, it is known that the roses must be picked in the form of buds ready to expand, as exposure of the fully-opened flowers to the air for a few hours results in the loss of perfume, the oil being situated, as shown by Blondel, in the epidermal cells of the upper and lower surface of the petals. On this account the buds, with the green calyx attached, are thrown into the stills. In gathering the roses a sticky substance adheres to and coats the fingers of the collectors. This is scraped off and made into small round balls of the size of marbles, and is used to mix with tobacco and give it a special aroma. For this purpose Mitow says it is chiefly used by the Arabs.

This substance consists of a fragrant glandular secretion formed in the setæ or gland-tipped bristles of the peduncle and calyx-tube. Of necessity, some portion of this substance must go into the stills and modify, to a certain extent, the odour of the petals. A French oil, prepared from the petals only, exhibited at the last International Exhibition in Paris, is said to have had an odour *sui generis* and to be *facile princeps* as otto. German rose oil differs from Bulgarian in containing about 10 or even 20 per cent. more stearoptene and a less percentage of alcohols, particularly of citronellol, from which Messrs Schlummel suppose that an equal quantity or more of geranium oil must be present in some specimens of Bulgarian oil. The stearoptene from the German oil is

stated by Messrs. Schimmel to have the same specific gravity as that of the Bulgarian oil, viz., 0.8746 and 0.8752 at 15° and a melting point of 32°C.

There is no trustworthy means of detecting the presence of geranium oil in rose otto. Even in genuine otto the amount of stearoptene is variable, being greater in the white rose than in the red, and in cold weather and later in the season increases in quantity, even in the red rose, and the sp. gr. of the otto varies in proportion to the amount of it present. The congealing point gives absolutely no clue to the actual amount of stearoptene present, since it has been found that in an oil with a congealing point of 29°C. there was 28.5 per cent. of stearoptene, and in another sample with a congealing point of only 1° higher, as much as 39.0 per cent. was present. In the British Pharmacopœia tests the optical rotation is not given; this in various samples of Bulgarian oil lies as a rule between  $-2.30^{\circ}$  and  $-3.30^{\circ}$ , yet in samples of German otto it may be as little as  $-0.44^{\circ}$ , and in French otto as much as  $-8^{\circ}$ , and in a Persian oil, believed to be pure, reached  $-9^{\circ}$ . The best method of testing the purity of the odour is probably by rubbing a drop of the otto with powdered starch or with chalk, or by placing a particle on a piece of blotting paper, and noting the changes in odour that it may or may not undergo during evaporation. A little practice soon enables one to recognize the odour of geranium oil, or of guaiacum wood, and the different characteristics of Bulgarian, French, or German otto. Indeed, it is stated to be possible for the expert in Bulgaria to recognize in this manner the otto from any particular district.

The strength or perfuming power of the otto is, perhaps, best tested by noting how many drops are necessary to give the requisite odour to a given amount of tooth powder or powdered starch, for it is evident that this will be influenced by the variable amount of odourless stearoptene present in the oil. There is now on the market a synthetic otto of rose. This is an imitation of the genuine, and contains crystalline matter, and in some cases either has a percentage of otto added to it or is distilled with rose leaves. In odour it is far inferior, as at present made, to the genuine otto, and does not go so far in mixed perfumes as the genuine article. When compared with the genuine otto on blotting paper it is easily distinguished by the difference in odour by any one accustomed to the fragrance of the natural product.

Attention of distillers of essential oils in this country and our Colonies is directed to the fact that there are localities in Eng-

land, as in Devon, South Wales, and Ireland, as well as in our Colonial possessions, where the requisite warmth, moist atmosphere, and soil to grow roses to perfection exist, and that there are roses more easily grown in this country than the Bulgarian variety, which, in sweetness, are not excelled by those of any European country. Among these may be mentioned the "Unique," a very floriferous white-flowered form of *Rosa centifolia*; the ordinary *Rosa damascena*, or damask rose of our gardens, the "General Jacqueminot," a hybrid perpetual, and Madame Isaac Pereire, said to be the sweetest rose grown. The old-fashioned maiden's blush has also a very sweet perfume, but, like the ordinary damask rose, and the *Rosa centifolia*, its period of flowering lasts only during June. The perfume of tea roses is remarkably powerful in the yellow rose "Maréchal Niel," which has never been utilized in a perfumery, although the oil of henna flowers is very similar to it in character, as is also that of *Bulnesia sarmienti*. There is no reason why an English otto of rose should not in the future earn the same reputation that English oils of lavender and peppermint already possess. The only difficulty is that of the price of labour, but in this industry, as in that of fruit picking, children can be employed without interference with their scholastic duties, and there are probably in Ireland many districts where suitable land could be obtained cheaply, and where the moist climate is eminently adapted for rose cultivation. If a mechanical means of separating the petals from the calyx could be devised, the odour would undoubtedly be far superior to that of ordinary otto of rose.

The following data, taken from Piesse's *The Rose Industry of Bulgaria*, p. 30, may be useful to any one who cares to experiment with the cultivation of roses for the distillation of oil:—

A hectare ( $2\frac{3}{4}$  acres) gives generally 3,000 kilogrammes, 6,600 lbs. of roses, which yield at most 1 kilogramme ( $2\frac{1}{4}$  lbs.) of otto. The gathering is made in the early morning, and is over by 9 o'clock, as roses gathered later have less perfume, and yield a smaller return.

**Pepper, Adulteration of with the Fruits of *Myrsine africana* and of *Embelia ribes*.** A. Mennechet. (*Journ. Pharm. Chim.* [6], 14, 557.) In addition to microscopical examination as a guidance to which figures of the distinctive elements of both adulterants are given, the following simple chemical test will at once detect either substitution. The powdered pepper is extracted with ether, the ethereal solution is mixed with water, and a few drops of ammonia are added, when in the presence of powdered *Myrsine*

or *Embelia* fruits a deep lilac-red colour will be produced. Pure pepper gives no such colour.

**Phellandrium aquaticum, Carbohydrates of the Seeds of Champenois.** (*Journ. Pharm. Chim.* [6], **15**, 228.) The fruits of *Phellandrium aquaticum* are found to contain 0.426 per cent. of saccharose, and 16.5 per cent. of reducing sugars, of which 3.87 is galactose and 9.47 arabinose. The residue of hydrolysis gave 1.375 mannose and 3.267 per cent. of pentoses.

**Phenolphthalein as an Aperient.** Vamossy. (*Merck's Report*, **1901**, 148.) Phenolphthalein is found to be an excellent and perfectly harmless aperient. The usual dose is  $1\frac{1}{2}$  to 3 grains, although, as the substance is quite innocuous, this amount may be considerably exceeded, as occasion may require. It is best administered in the form of pills, massed with milk-sugar and gum acacia, each containing  $1\frac{1}{2}$  grains of phenolphthalein. From 1 to 10 of these may be taken as required.

**Petrosapol.** (*L'Union Pharm.*, **43**, 106.) This is a compound of soap with certain petroleum residues which, from its high melting point, 90°C., is specially useful as an application in skin diseases to those parts which are covered with hair, such as the scalp. It forms a brown, unctuous mass, and may either be applied unmixed, or diluted with vaseline, or combined with zinc oxide, starch, resorcin, epicarine or talc. It has been employed with success in the treatment of inflammation of the sebaceous glands.

**Phytolacca decandra Leaves as an Adulterant of Belladonna Leaves.** C. Hartwich. (*Schweiz. Woch. für Chem. und Pharm.*) The leaves of *Phytolacca decandra* are used to adulterate belladonna leaves, just as the root of the one plant has been substituted for the other, as pointed out by E. M. Holmes and H. G. Greenish (*Year-Book*, **1901**, 134). Although the general form of the two leaves is very similar, the structure of the epidermal tissue serves to distinguish them. In *Belladonna*, the epidermal cell-walls are sinuate, and the cells of irregular shape; rounded stomata are present on both the upper and under surface of the lamina. In *Phytolacca*, the epidermal cells are polygonal, and the stomata more elliptical. The leaves of *Scopola carniolica* are also used as a substitute for belladonna leaves, and are even more difficult to detect by their microscopical characters. Whole leaves may be differentiated by the fact that they show no stomata on the upper surface, and no simple hairs, but wart-like papillæ. The outline

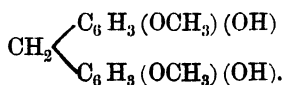
of the epidermal cells is more sinuate than in belladonna, and the form of the cells more irregular.

**Piper fameschoni**, **Constituents of**. A. Barillé. (*Comptes rend.*, **134**, 1512.) A new pepper, indigenous to Upper Guinea, has been named *Piper fameschoni* by Heckel, and was handed to the author for chemical examination. The fruits are of a brownish black colour, very variable in size and shape, but being generally smaller than common pepper, and having a persistent pedicle, like cubebs. They give a reddish-brown, very fragrant powder, with an acrid, aromatic taste. They have been employed as a condiment by the troops in the French Soudan. They contain 4.47 per cent. of a very fragrant volatile oil, the bulk of which distils between 225° and 260°C. They have the following percentage composition: Moisture, 14.604; ash, 4.55; volatile oil, 4.47; piperine, 3.654; starch, 38.004; cellulose, 10.009; glucose, 5.208; saccharose, 1.663; albuminoids, 10.253; alcoholic extractive, 19.25; aqueous extractive, 16.076; tannin, 0.26; gum, pectin, colouring and soluble nitrogenous matter, 5.275; resin and fixed oil, 3.995; total nitrogen, 1.820.

**Pneumin**. (*Merck's Report*, **1901**, 150.) This is a yellowish, odourless and tasteless powder obtained by the action of formaldehyde upon creosote. It is freely soluble in alcohol and in ether, but does not dissolve in water. J. Jacobson has shown pneumin to be a valuable remedy in the treatment of tuberculosis, stimulating the appetite, increasing the weight, lessening the cough and the night-sweats. It is administered in single doses of 8 grains, mixed with sugar, until a maximum of 30 grains per diem has been attained.

**Prickly Ash**. W. L. Cliffe. (*Amer. Journ. Pharm.*, **73**, 562.) Although the barks of both *Xanthoxylum americanum* and *X. clava-herculis* are official in the U.S.P. as "prickly ash," the former being indigenous to the Northern, the latter to the Southern States, only the last named should be used in medicine, since it is far richer in the extractives to which the therapeutic action of the bark is due.

**Pulmoform** (*Merck's Report*, **1901**, 152) is closely related to pneumin and is obtained by the action of formaldehyde upon guaiacol. Chemically it is methylene-di-guaiacol, as shown by the formula



Like pneumin, it forms a yellow, tasteless powder. J. Jacobson describes it as fully equivalent to pneumin in its therapeutic action, when given in the same doses.

**Purgatin or Purgatol (Anthrapurpurin Acetate).** (*Merck's Report, 1901, 153.*) A yellow micro-crystalline powder which is insoluble in water and sparingly soluble in alcohol, but freely dissolves in glacial acetic acid and xylol. Its melting point is 175°C.

Synthetic purgatin belongs to the series of oxyanthraquinones, that class of substances which includes the active constituents of the majority of drugs employed as laxatives, such as aloes, rhubarb, senna, etc. According to the experiments of C. A. Ewald, E. Stadelmann, W. Ebstein and H. Vieth, it possesses the properties of a mild aperient, but shares with its congeners the unpleasant feature that its use is followed by a certain weakening of the intestine. Over the other laxatives it has, however, the advantage of being tasteless and devoid of troublesome effects. The dose is 30 grains. It is specially indicated in chronic constipation occurring in neurasthenia, hypochondria or haemorrhoids, where it is appropriately employed in the place of rhubarb and aloes in small doses of  $7\frac{1}{2}$  grains, or more, if required. Purgatin possesses the unpleasant secondary property that it colours the urine red.

**Pyramidon Compounds.** (*Merck's Report, 1901, 154.*) *Pyramidon bicamphorate* is stated to have, at the same time, a powerful antithermic effect on the temperature in tuberculosis, and to check the sweating. In *Pyramidon neutral camphorate* the antipyretic effect predominates. *Pyramidon salicylate*, although inferior to sodium salicylate in its action in cases of acute articular rheumatism, is at least its equal in subacute and chronic cases. The bicamphorate, being freely soluble in water, may be prescribed in the form of a mixture; the dose is 15 grains per diem. The salicylate and neutral camphorate are given in single doses of  $7\frac{1}{2}$  to 12 grains. Pyramidon and its salts should not be given in cases of diabetes.

**Quinic Acid and its Salts.** (*Merck's Report, 1901, 30.*) Our knowledge of the therapeutic properties of quinic acid and its compounds, viz., Urosine (Lithium quinate) Quinotropine (Urotropine quinate), Sidonal (Piperazine quinate) and Urol (Urea quinate) has been considerably added to in the course of the last twelve months. In accordance with the prevailing theory of the transformation of quinic acid within the system, the acid, when

reduced to benzoic acid, combines with glycocoll and forms hippuric acid, the salts of which are much more soluble than uric acid. As far as it is possible to judge from the observations recorded up to the present, it is at least certain that the introduction of quinic acid into the system results in a diminution of the formation of uric acid and in an increase in the proportion of hippuric acid. Although the theory of the action of quinic acid still needs elucidation, yet it appears from clinical observations that the acid is a useful remedy for the treatment of gout.

De la Camp considers quinate of urotropine (Quinotropine) to be worthy of recommendation, if for no other reason, because it splits up in the human system and forms formaldehyde, with which uric acid is said to yield compounds which are freely soluble.

Quinate of piperazine, the so-called sidonal, is the subject of recent therapeutic investigation by J. von Rosenthal, Salfeld, Bardet and Lindsay Porteous, from which it appears that this preparation appreciably alleviates the symptoms of acute and subacute gout.

According to the statements of H. Sternfeld, R. Manifold Craig and F. Kölbl, urosine has also proved to be efficacious in the treatment of typical acute and chronic forms of gout.

On Urol, which has been recently introduced, there is so far only one communication, by C. von Noorden. This substance is a compound of 2 molecules of urea and 1 molecule of quinic acid; it freely dissolves in water and in dilute alcohol. It has proved a valuable acquisition for the treatment of gout and uric concretions in the kidneys. The dose of urol is 30 to 75 grains per day in 13 fl. ozs. of hot water, one half of which should be taken in the morning on an empty stomach, whilst the other half in the evening, before retiring. When administered in this manner, it occasions no discomfort or gastric trouble.

**Quinine Dihydrobromide Injections in Chronic Malarial Fever.** G. B. Ferguson. (*Brit. Med. Journ.* [1], 1902, 439.) The author has obtained excellent results in the treatment of chronic malaria by the injection of 3 grains of quinine dihydrobromide dissolved in 20 minims of warm water. Six such injections are usually required on alternate days, the first being given under the skin of the upper arm, then under that of the thighs, then under the abdominal skin, and finally under that of the upper thoracic region or between the scapulæ. The skin and the operator's hands are first disinfected with strong carbolic solution and the needle

point is sterilized by burning. The quinine solution should be sterilized.

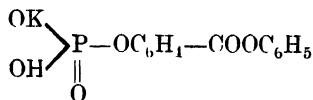
**Rheumatine.** (*Merck's Report*, 1901, 155.) Rheumatine or salicyl-quinine salicylate,  $C_6H_4.CH.COOC_{20}H_{23}N_2O.C_6H_4.OH.COOH$ , forms white tasteless needles, which are sparingly soluble in water and melt at  $179^\circ C$ .

According to Overlach rheumatine possesses excellent antirheumatic properties and has proved efficacious in the gravest cases of acute articular rheumatism aggravated by recurrence and complications. It is given in doses of 15 grains thrice daily for the first three days; the treatment is interrupted on the fourth day, after which 60 grains is given in the day for 4 days, the treatment being then remitted every fifth day.

**Saffron, Crimean, Wild.** (*Pharm. Zeit.*, 46, 381.) Considering the profusion in which the indigenous *Crocus autumnalis* and *C. sativus v. palassii* occur in the Crimea, and the cheapness of labour in the district, it is pointed out that probably these wild plants might furnish an economical source of saffron, since the aroma and tinctorial power of the dried stigmas are equal to those of the cultivated plant.

**Saloquinine.** (*Pharm. Zeit.*, 46, 523.) This is the salicylic ester of quinine, having the constitution  $C_6H_4OH.CO.OC_{20}H_{23}N_2O$ . It occurs as insoluble crystals melting at  $130^\circ C$ ., and possesses antiperiodic and antiseptic properties as well as being analgesic in neuralgia and similar nervous pains.

**Salvosal Potassium and Salvosal Lithium.** (*Apoth. Zeit.*, 21, 591.) These two salts of salol-orthophosphinic acid, have been introduced into medicine as substitutes for salol, in the treatment of rheumatism and other kindred affections. The potassium salt



has an acid reaction and dissolves in water to the extent of 1:20. It liberates salol, salicylic acid and potassium phosphate on warming. The lithium salt is analogous in structure and composition. Both are given internally in daily doses of 45 to 75 grains.

**Scammony, Analysis of.** P. Guignes. (*Rev. Pharm.*, 13, 11.) In consequence of the discordant results obtained in the determination of the amount of resin in scammony, according to the quality and quantity of the extracting liquid employed, the



following method is suggested. After carefully sampling the cakes, a known weight is introduced into a small flask and gently warmed with a little water. The scammony thus treated rapidly softens and disintegrates, forming a thick emulsion. This is then extracted with two or three portions of hot alcohol 95 per cent. Two or three treatments are sufficient to remove all the resin. The alcoholic solutions are bulked, evaporated, the residual resin dried at  $100^{\circ}$  and weighed. *Guaiacum resin*, added as an adulterant, may be detected in this residue by the production of a blue colour with  $\text{H}_2\text{O}_2$  or with a 5 per cent. solution of  $\text{Fe}_2\text{Cl}_6$ ; and by a green tint with solution of sodium hypochlorite. *Colophony* may be detected by burning a portion of the resin, which, if pure, should not give a terebinthinous odour. *Foreign resins* are detected by redissolving the resinous residue in boiling alkali, and adding excess of acid to the cold solution. Convolvulaceous resins remain in solution while the others are precipitated. The amount of ash, as well as of resin, should be determined.

**Septoforma** (*Pharm. Centralh.*, **42**, 670.) Under this name a new antiseptic disinfectant has been introduced into veterinary practice on the Continent. It is stated to be a condensation product of formaldehyde, dissolved in alcoholic solution of soft soap prepared from linseed oil. It is non-toxic, odourless, non-irritant and soluble. As a general disinfectant for stables, etc., a 10 per cent. aqueous solution is recommended. For disinfecting the hands a 1 in 45 solution is employed, and for instruments a 5 or 10 per cent. dilution. For wounds on animals a three per cent. solution should be used as a dressing; the same is an effectual remedy for saddle galls. Mange may be cured by the application of a 10 per cent. (methylated) spirit solution to the previously shaved parts, followed by the application of the weaker mixture. An ointment of septoforma 1 with lanolin 9 is useful as a general bactericide and antipurulent dressing. Otorrhœa in dogs yields to syringing with a 2.5 per cent solution. The bacilli of chicken cholera are destroyed by a 7 per cent. dilution. Mites on birds may be destroyed by painting with septoforma or washing with septoforma soap. In 5 per cent. solution it acts as a powerful deodorant for stables and lavatories.

**Silicate salts, Therapeutic Value of.** (*Brit. Med. Journ. Epit.*, **1902**, 76.) Siegfried (*Arch. Internat. de Pharm. et de Therap.*, **9**, 225) gives a full account of the physiological action and therapeutic uses of the sodium silicates and fluorides. They have hitherto been little used in therapeutics, but their

properties indicate their value in the following conditions. In acid poisoning, sodium silicate is much to be preferred to carbonates, which generate carbonic acid, since it gives the stomach wall a protective mucilaginous coating. In acid dyspepsia it is indicated as a table water; it is also of much value in gout. It has been used by Kobert and others in phthisis with the idea of stimulating the development of fibrous tissue by the deposit of siliceous matter in the lung. Kobert has administered 15 to 30 grains doses without bad effects, but he has not arrived at a final opinion as to its exact value. With regard to fluorine compounds, fluoroform has been recently used in acute pneumonia, and other compounds may very probably prove of considerable service in rickets.

**Silver Acetate in Infantile Ophthalmia.** Zweifel. (*Centr. für Glynekol.*, through *Merck's Report*, 1901, 44.) A 1 per cent. solution of silver acetate is preferable to the 2 per cent. solution of silver nitrate usually employed as a prophylactic against *ophthalmia neonatorum*, since it is not only more efficacious, but, at the same time, much less irritating. Of 5,222 cases treated with it only 12 became infected with ophthalmia. Any trace of irritation produced may be at once alleviated by the application of a douche of sodium chloride solution to the eye.

**Sodium Persulphate in Anorexia.** (*Merck's Report*, 1901, 146.) The alkaline persulphates, and especially the sodium salt, have been found to be useful stimulants of the appetite. Under the name "Persodine" a solution of sodium persulphate has been employed for this purpose on the Continent. A similar preparation may be obtained by dissolving sodium persulphate 1 in distilled water 150. One table-spoonful of this should be taken half an hour before the two chief meals.

**Sodium Phenolo-Sulpho-Ricinate.** (*Merck's Report*, 1901, 148.) Dreyfuss has obtained excellent results by treating ozæna with a 33 or 50 per cent. aqueous solution of sodium phenolo-sulphoricinate, applied to the pituitary membrane and the nasal fossæ by means of a sound covered with cotton wool, moistened with the solution. The application is made once daily.

**Sodium Succinate.** (*Merck's Report*, 1901, 132.)  $\text{Na}_2\text{C}_4\text{H}_4\text{O}_4 + 6\text{H}_2\text{O}$ . White crystals freely dissolving in water. C. F. Hope emphatically recommends sodium succinate in catarrhal icterus. The treatment is associated with a non-irritant diet and a copious supply of alkaline mineral waters; at the same time the bowels should be kept open. The preparation is best adminis-

tered in accordance with the following formula: Sodium succinate, 3; fennel water, 120; simple syrup, 30; 1 tablespoonful to be taken every 3 hours.

**Solanum Chenopodium, Solanine in.** C. E. Sage. (*Pharm. Journ.* [4], 14, 174.) The drug is stated by E. B. Omerod to have a reputation as a remedy for dysentery, for which purpose it is employed in the form of an infusion of the leaves, berries and stalks. The author finds that it contains a small amount of alkaloid, which he has identified as solanine.

**Spartium Flowers substituted for Sarothamnus in Diuretic Species.** E. Perrot (*Journ. Pharm. Chim.* [6], 14, 19) calls attention to the dangerous substitution of the flowers of the Spanish broom, *Spartium junceum*, for those of the common broom, *Sarothamnus scoparius*, in a mixture of herbs destined for the preparation of a diuretic "tisane." As the result of this substitution, several grave cases of poisoning ensued, the error being finally traced to the herb collector, who supplied as "broom" the flowers in question. Although the chemical constituents of spartium have not been definitely investigated, the dried flowers are reputed to be five or six times as potent as those of the common broom. The flowers are easily distinguishable. Those of *Spartium* have the calyx deeply cleft to the base on one side only; the style is simple, recurved, but not twisted. *Sarothamnus* has a small campanulate calyx with two unequal lips, the superior lip being bidentate, the inferior, with three small teeth; the style is always rolled in a circle.

**Strophanthus, The Official Colour Test for.** E. M. Holmes. (*Pharm. Journ.* [4], 14, 254.) It is found that, in order to obtain a sharp colour reaction, sulphuric acid containing 80 per cent. of  $H_2SO_4$  should be employed. With a stronger acid the charring obscures the reaction, while with weaker acid the colour does not appear quickly. The reagent should therefore be prepared from 8 parts (by volume) of sulphuric acid, sp. gr. 1.843 and 2 parts of water.

**Thebaine Hydrochloride in Neurasthenia.** (*Merck's Report*, 1901, 165.) Recently A. Velics has advocated the use of thebaine hydrochloride as a remedy in grave cases of neurasthenia, in conjunction with nourishing diet to promote increase of weight up to the desired point. It is given internally in initial doses of  $\frac{3}{4}$  grains dissolved in Malaga wine, and amount is gradually raised to  $2\frac{1}{2}$ –3 grains.

**Thiopyrine and Selenopyrine.** Michaelis, Binde, Wald, and Stein. (*Liebig's Ann.*, **320**, through *Pharm. Zeit.*, **47**, 186.) *Thiopyrine*,  $C_{11}H_{12}N_2S$ , occurs in monoclinic crystals melting at  $166^{\circ}C$ . It is fairly soluble in cold water. With nitrous acid its solution does not give a green colour, nor is it coloured red with  $Fe_2Cl_6$ ; negative reactions which distinguish it from antipyrine. It has similar but less powerful therapeutic properties than antipyrine. *Selenopyrine*,  $C_{11}H_{12}N_2Se$ , forms hard, glittering, yellow crystals isomorphous with thiopyrine, and melting at  $168^{\circ}C$ . In general reactions it agrees closely with thiopyrine.

**Thymol Carbonate (Thymotal).** (*Merck's Report*, **1901**, 166.) A white, tasteless, neutral crystalline substance fusing at  $49^{\circ}C$ . Thymol carbonate is recommended by J. F. Pool as a substitute for thymol, over which it possesses several advantages as an internal remedy, since it is tasteless and nearly odourless, and better tolerated. Thymol carbonate involves also considerably less risk of thymol intoxication, which is greatly in its favour in the case of children enfeebled by anchylostomiasis. Doses of 30 grains for adults, 15 grains for children,  $7\frac{1}{2}$  grains for infants, may be administered three or four times daily for a period of four days. On the fifth day an aperient should be prescribed, after which the course of the treatment should be repeated until the evacuations are found to be free from worms.

**Thymus Gland in Rickets.** (*Brit. Med. Journ.* [1], **1902**, 40.) Mendel (*Munch. Med. Woch.*, Jan. 28, **1902**) quotes Friedleben to show that the function of the thymus gland is intimately associated with a proper development and growth of bone. The symptoms of rickets are in part due to a disturbance of the function of the thymus, and its existence depends on the latter. He points out that the enlargement of the spleen in rickets may be regarded as a vicarious hypertrophy. During the last five years he treated over 100 cases of rickets with thymus. At first he used fresh gland, minced and given as a thick soup, in doses of as many Gm. as the child was months old. Later he used tabloids. In no case did he meet with any untoward effects of the gland, and he believes it to be absolutely harmless. The symptoms, including the early anæmia, sweating, and restlessness, the bone changes, the nervous symptoms—for example, spasm of the glottis and the splenic enlargement—all gradually diminished and eventually disappeared. The treatment had mostly to be continued for some months, but less energetic methods rapidly produced an arrest

of the disease. He describes the beneficial effects in glowing language.

**Triferrin.** (*Merck's Report*, 1901, 168.) Under this name iron para-nucleinate, containing about 22 per cent. of iron, has been successfully prescribed in chlorosis and other anæmic conditions. The dose is 5 grains three times daily, either as a powder or in tablets with a chocolate basis.

**Tropacocaine Hydrochloride.** (*Merck's Report*, 1901, 168. See also *Year-Book*, 1901, 171.) This preparation, which is largely used in the place of cocaine as a local anæsthetic, has been warmly advocated by K. Schwarz for effecting medullary anæsthesia by Bier's method, since by its means the unpleasant features of the method may be avoided. W. Meyer, F. Neugebauer, and W. Kopfstein have used tropacocaine in the place of cocaine and eucaïne in the application of Bier's method and have unanimously arrived at the conclusion that it is distinctly superior to the other anæsthetics named, since it is less toxic. The doses of tropacocaine required for anæsthesia vary from  $\frac{1}{2}$  to  $\frac{2}{3}$  to  $\frac{3}{4}$  to 1 grain. The smallest dose of  $\frac{1}{2}$  grain suffices only to induce complete anæsthesia up to the knee, whereas the upper parts of the body fail to be affected. Doses of  $\frac{3}{4}$  to 1 grain admit of a wide range of operations of the lower extremities, the perineum and its immediate vicinity, and are described by Neugebauer as a certain and safe means of inducing analgesia. The application of tropacocaine in dental surgery is the subject of communications by F. Samu, Reissenbach, R. Bloch and Deák, who unanimously extol the prompt anæsthetic properties of the preparation in dental operations. Annin has successfully employed the remedy in ophthalmic surgery.

**Turpentine in Ringworm.** (*Brit. Med. Journ. Epit.* [2], 1901, 76.) Leven (*Journ. des Mal. Cut. et Syph.*) recommends oil of turpentine in ringworm and *pityriasis versicolor*. In the latter disease the oil is rubbed in daily for five minutes. In ringworm, pieces of linen soaked in the oil are applied night and morning. After six days the patches become inflamed and the epidermis exfoliates. The skin is afterwards dressed with simple ointments.

**Urotropine as an Intestinal Disinfectant.** (*Brit. Med. Journ. Epit.* [2], 1901, 64.) Loebisch (*Wien. Med. Presse*) discovered that urotropine (hexamethylene-tetramine) is an excellent intestinal disinfectant; on testing the urine of a man who was taking  $7\frac{1}{2}$  to 15 grains of urotropine daily for posterior urethritis, it

was found to contain no indican (potassium indoxylsulphate). In experiments conducted with an ordinary mixed diet, the indoxylsulphuric acid excreted in the urine was greatly diminished or altogether suppressed, if half a drachm of urotropine were taken daily. Urotropine is superior to most other intestinal antiseptics, including phenol, cresol, tribromophenol, alphanaphthol, and thymol, since it is not poisonous. Being very soluble in water, it is readily absorbed, and is, therefore, preferable to salol, aspirin, and resaldol. Though urotropine has long been recommended as a disinfectant of the genito-urinary tract, its action on abnormal intestinal putrefaction has been hitherto overlooked.

**Valyl.** (*Merck's Report*, 1901, 171.) Valerianic acid-di-ethylamide  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{N}(\text{C}_2\text{H}_5)_2$ . This is a limpid fluid with a peculiar odour and a sharp burning taste, boiling at  $210^\circ\text{C}$ . According to H. Kionka and A. Liebrecht, valyl possesses, in a marked degree, the characteristic nervine properties of valerian root. Its use is accordingly indicated in hysteria, traumatic neurosis, migraine, neuralgia, irregularities during menstruation and climacteric troubles. Owing to its sharp and unpleasant taste the preparation is supplied, mixed with an equal proportion of suet, enclosed in gelatin capsules, each of which contains 2 grains of valyl. Of these capsules 2 or 3—in obstinate cases 4 to 6—should be taken three times daily.

**Vanadium Salts in Medicine.** (*Brit. Med. Journ. Epit.* [2], 1901, 88.) Lyonnet, Hartz, and Martin (*Lyon Méd.*, 1901) have had further experience, experimental and therapeutic, of the use of vanadium, and claim to have confirmed the conclusions which they published in 1899. When used therapeutically no ill-effects have followed the administration of  $\frac{1}{16}$  to  $\frac{1}{8}$  grain of meta-vanadate of sodium per diem, given three days in each week. There is now a mass of independent evidence to show that vanadium stimulates the gastric mucosa, increases the appetite, and thus improves the general condition of the patient. The drug has been found of special service in cases of tuberculosis, chlorosis, neurasthenia, and, occasionally, in cancer of the stomach. Various combinations of vanadic acid have been tried. Strychnine vanadate—prepared by mixing sodium vanadate and strychnine sulphate—has been employed with satisfactory results in tuberculosis, neurasthenia, and atonic dyspepsia. Vanadates of caffeine and of quinine and a phospho-vanadic acid have also been prepared and used. The authors believe that they are justified in claiming

an important place for vanadate of sodium among the stimulants of appetite and nutrition.

**Vanilla, Sophistication of, with Benzoic Acid.** H. Lecomte. (*Schweiz. Woch. für Chem. und Pharm.*, **40**, 30.) Inferior vanilla beans have been met with, to which a fictitious appearance of good quality has been imparted by covering the surface with crystals of benzoic acid to simulate the crystals of vanillin, which is found on the best pods. If to a small quantity of alcoholic solution of phloroglucin, in a watch glass, an equal volume of HCl be added, and a crystal of the efflorescence be dropped into the mixture, fine red colour is produced by vanillin, while benzoic acid gives no colouration.

**Vioform.** Krecke. (*Münch. Med. Woch.*, **48**, 1311.) Iodo-chloroxy-quinoline, which has been introduced as an iodoform substitute under the name of vioform, has been subjected to thorough clinical and bacteriological tests. Injected in very large doses it gives rise to no toxic symptoms; as a dressing for wounds of all kinds it has given good results. It is best prescribed in the form of an emulsion, thus: Vioform, 50; glycerin, 200; sterilized water, 200; alcohol, 100. M.s.a. Sterilized gauze is impregnated with this and laid over the wounds as a dressing. In no instance has vioform been found to be inferior to iodoform; in many cases it has proved more effectual, while its freedom from odour renders it generally preferable to that substance.

**Yeast, Medicinal Properties of.** (*Merck's Report*, 1901, 83.) Streppel finds that yeast is most effective in juvenile acne. In these cases  $\frac{1}{2}$  teaspoonful to 1 tablespoonful of fresh yeast, mixed with water, should be given once or twice daily with meals. According to S. Xumetra powdered yeast, administered internally, exercises a most beneficial influence upon the development of smallpox and the duration of the disease; it diminishes suppuration and the formation of scars and abscesses upon the mucous membrane. Bossan obtained good results from the use of yeast in the treatment of broncho-pneumonia in the course of measles. He introduced  $1\frac{1}{2}$  teaspoonfuls of dry yeast mixed with  $2\frac{1}{2}$  fl. ozs. of boiled water, by the aid of Nelaton's sound as deeply as possible into the rectum, and ordered at the same time warm mustard baths and stimulants.

**Ylang-ylang Oil.** (*Chem. and Drugg.*, **30**, 388.) The cultivation of ylang-ylang and the commercial distillation of the oil was first conducted by Germans in the island of Luzon in the early sixties of last century, but it was not until 1878, when it was

first exhibited at Paris, that the oil became widely known. The ylang-ylang tree (*Cananga odorata*, Hooker, or *Unonia odoratissima*), common to many localities south of Manila, is found chiefly in the well-populated provinces, where it thrives best. It is propagated by planting seedlings or cuttings about twenty feet apart each way, when they grow rapidly in almost any soil. The first flowers appear in the third year, and in the eighth year a tree yields as much as 100 lbs. The blossom grows in every month of the year, but the greatest yield is from July to December. The petals are subjected to the simplest form of distillation, and the best quality of oil is as clear as distilled water and fragrant, while the second quality is yellowish and somewhat empyreumatic. About 75 lbs. of flowers yield 1 lb. of oil; flowers are worth from 8c. to 15c. gold per lb., and the cost of manufacturing is about \$4 per lb. There are flowering groves in many parts of South Luzon and the Visayan Islands, but the vicinity of Manila is also well adapted to the growth of this tree. Naturally the Spanish-American war greatly interfered with the industry, but as affairs have been practically settled for some months past, distillation has been taken up on the same scale as before. Last year there was a great scarcity of fine ylang-ylang oil on the European markets, with an abundance of medium and cheaper qualities. There is little sale for the oil on this market, but occasionally direct shipments of small quantities from Manila are sent to London and offered in public auction. Although Java produces ylang-ylang oil in small quantities, it has not the commercial importance of Manila oil, which is much sought after by soap-makers and perfumers.



## PHARMACY.



## PART III.

### PHARMACY.

**Alcohol, Influence of on Pepsin.** E. Thibault. (*Journ. Pharm. Chim.* [6], **15**, 1, and 161.) It is found that the presence of 1 : 31 of alcohol 90 per cent. has a slight but distinct inhibitive effect on artificial digestion, and that when the proportion of alcohol reaches 1 : 21 the retarding effect is very marked. With the menstruum of the elixir of pepsin of the Codex 20 Gm. of this liquid, equivalent to a proportion of 1 : 32 of alcohol, causes a marked lessening of the digestive action. Muscatel-Lunel wine also retards the proteolytic fermentation when the digestion is made in the presence of 10 Gm. of wine. Glycerin is also found to have a slight but distinct action in lessening the digestive activity of pepsin.

The prolonged contact of alcohol with pepsin is also found to markedly modify its digestive power, so much so that wine, which is widely used as a vehicle for pepsin, cannot be regarded as at all a suitable medium for the purpose. It is found that alcohol, unmixed with other substances, will, after a certain time, render pepsin quite inert. The diminution of peptonizing power begins at once, and is directly in proportion to the amount of alcohol present, but even with relatively dilute solutions the action is rapid and ultimately complete.

**Aqua Hæmostatica. Eau de Pagliari.** (*Bull. Comm.*, **42**, 518.) Benzoic acid, 2; tincture of benzoin, 10; alum, 80; boiling distilled water, q.s. Dissolve the alum in boiling water and cool. Add the benzoic acid dissolved in the tincture of benzoin and shake thoroughly; allow to stand for an hour, filter, and add sufficient boiling water (through the filter) to obtain 1,000 parts.

**Aristol Ointment.** C. Asseward. (*Amer. Drugg.*, **34**, 205.) One or two ounces of aristol is placed in a dry mortar, and just enough ether is added to form a paste. Olive oil equal in weight to the aristol taken is then added, and the mixture stirred until a

perfectly smooth paste is obtained. In about two hours all ether will have evaporated, providing it has been stirred well several times. This paste is kept in a wide-mouth glass-stoppered bottle (amber), and by using twice as much of it as of aristol prescribed, a perfectly smooth ointment is obtained in a few minutes.

**Asterol Solutions.** P. Schwarz. (*Pharm. Centralh.*, **42**, 527.) Solutions of asterol from 0.4 to 2 per cent. may be easily obtained by treating the substance with hot water, or by boiling asterol with water and filtering. Concentrated solutions containing 8 per cent. of asterol may be obtained by heating asterol 8 and boric acid 6, with water 70, to boiling, then removing the source of heat and immediately adding 20 per cent. ammonia solution 25. After cooling, the volume is adjusted to 100, and the solution filtered. It should be kept in the dark; exposure to light causes reduction, but, properly preserved, the solution is fairly constant.

**Belladonna Collodion, B.P.C.** G. F. Merson. (*Pharm. Journ.* [4], **14**, 234.) The use of the official fluid extract, instead of the alcoholic leaf extract at present prescribed, is advocated, the strength being reduced from 0.5 to 0.35 per cent. of alkaloids, thus:—Fluid extract of belladonna, 10 ozs.; purified ether (sp. gr. 0.720), 10 ozs.; liquid chlorophyll of commerce,  $\frac{1}{2}$  oz. Mix and shake well; stand for twelve hours, decant, filter, and in the mixture dissolve: Camphor, 130 grains; pyroxylin,  $\frac{1}{2}$  oz. The product should measure one pint. Thus prepared, a brilliant and elegant fluid plaster is obtained equal in every respect to that made by the process of the B.P.C. Formulary from the green leaf extract, and with very much less trouble.

If it be desirable to maintain the strength of the preparation at 0.5 per cent. of total alkaloid, this may be obtained by evaporating the requisite quantity of the official fluid extract to a soft consistency, and redissolving in alcohol and ether.

**Belladonna, Green Plaster of, B.P.C.** G. F. Merson. (*Pharm. Journ.* [4], **14**, 234.) The use of the official liquid extract, and tinting the plaster with chlorophyll, is suggested as a substitute for the green alcoholic leaf extract thus:—Liquid extract of belladonna, 4 ozs.; evaporate to 1 oz. and add liquid chlorophyll,  $\frac{1}{2}$  oz.; resin plaster to produce, 12 ozs. Mix.

**Belladonna, Liquid Extract of.** E. A. Andrews. (*Pharm. Journ.* [4], **14**, 336.) The following modification of the process for preparing the fluid extract of belladonna is recommended as occupying less time for completion. Take 40 ozs. of menstruum, ordered in the B.P., and 2 lbs. of belladonna root in No. 20 powder;

moisten 8 ozs. of the powder with 4 ozs. of the menstruum, pack moderately tightly in a percolator and let stand for 16 hours, attach to the automatic supply, and allow the menstruum to drip on to the drug at such a rate that it is moistened right through, and a distinct stratum of fluid formed on top in five hours; attach a receiver, and let the rate of percolation be such that 4 ozs. of percolate is collected in another 3 hours. Stop the flow of the menstruum. Use the 4 ozs. of percolate to moisten a second 8 ozs. of drug, pack in a percolator, attach to this a tube from the first percolator, and let stand for 16 hours. Allow the menstruum to drip into first percolator, and the percolate from No. 1 to drip on to the drug in No. 2 at such a rate that it is moistened through and a stratum formed on top in 5 hours. Attach a receiver and collect 4 ozs. of percolate in 3 hours. The same procedure is then followed with the third and fourth quantities of drug, passing the percolate from No. 2 into a third percolator, and the percolate from No. 3 into a fourth. At the end of the fourth day 4 ozs. of strong percolate will have been collected, the remaining  $8\frac{1}{2}$  ozs. being collected on the fifth day, allowing percolation to proceed at the same rate as on the preceding days. When the 40 ozs. of menstruum has dripped into the first percolator it is raised, and when percolation ceases, or is so slow that there is danger that a distinct stratum of fluid will not be kept on No. 2, it is disconnected, the marc pressed, and the pressed fluid poured on No. 2. Percolators 2 and 3 are treated in the same manner.

The advantages claimed for the method are: (1) that a batch of the liquid extract can be prepared in five days; (2) the periods of maceration are convenient; (3) a definite quantity of menstruum is used for the process; (4) the loss of spirit by evaporation during the process is reduced to a minimum; (5) the amount of alkaloids extracted is about the same as when strictly following the B.P. directions, but will vary slightly according to the condition of the drug; and (6) the same results are obtained when working on large or small quantities of the same batch of drug. The only disadvantage is that the process extracts a somewhat smaller percentage of total solids—a questionable objection, since the extractive might vary to the extent of two or three per cent., according to how the words “pack firmly” and “slow percolation” were construed; also because belladonna root itself differs in the amount of extractive it contains, some samples giving a liquid extract containing as little as 9 per cent. of solids, whilst others

contain as much as 18 or 19 per cent. A sample of belladonna root was obtained which answered the description of a No. 20 powder. This was used for experiments Nos. 1 and 2. For experiments Nos. 3 and 4 belladonna root in stock was taken, consisting of some very coarse particles which could not possibly go through a No. 20 sieve, and a large proportion of very fine powder. The following table shows the results obtained:—

| Strong Extract. |                      |          | When Diluted to B.P. Strength. |                   |                         |
|-----------------|----------------------|----------|--------------------------------|-------------------|-------------------------|
| Experiment.     | Percentage Alkaloid. | Average. | Sp Gravity.                    | Percent. Extract. | Ratio Solid to Alkaloid |
| 1. Mod.         | { 1.09 }<br>{ 1.05 } | 1.07     | 0.895                          | 8.75              | 11.6 : 1                |
| 2. B.P.         | { 1.03 }<br>{ 1.05 } | 1.01     | 0.898                          | 9.35              | 12.4 : 1                |
| 3. Mod.         | { 0.95 }<br>{ 0.95 } | 0.95     | 0.892                          | 9.02              | 12.0 : 1                |
| 4. B.P.         | { 0.98 }<br>{ 0.98 } | 0.98     | 0.904                          | 10.64             | 14.1 : 1                |

**Belladonna and Hyoscyamus Extracts, Distinction between.** W. Stoeder. (*Pharm. Zeit.*, **46**, 541, after *Pharm. Weekb.*) 10 Cgm. of the extract is dissolved in 2 c.c. of water; the solution is shaken out with 10 c.c. of ether. This ethereal solution is then shaken out with 5 c.c. of water containing 2 drops of solution of ammonia. Belladonna extract imparts to the ammoniacal aqueous layer a blue fluorescence, which is not given by extract of hyoscyamus.

**Bismuth Citrate and Solution of Ammonio-Citrate of Bismuth.** W. Duncan. (*Chem. and Drugg.*, **60**, 852.) The reaction between bismuth subnitrate and citric acid is found to take place slowly but completely, in the presence of water, in the cold. The following method is employed for preparing the salt: Take 302.64 parts of bismuth subnitrate, 208.5 of citric acid, and 83.43 of sodium bicarbonate. The citric acid is powdered, mixed in a mortar with the bismuth, and made into a cream with a sufficient quantity of water, and the whole set aside for two hours, occasionally stirring. When the action is complete (known by dropping a little of the creamy paste into ammonia and seeing if a clear solution is obtained), the alkali is cautiously added, and the citrate finally washed. A similar method is adopted when using excess of citric acid, but omitting the addition of alkali. The reaction is usually

completed in half an hour, the time varying with the quantity of water originally used to form the cream. Eight hundred grains of this citrate, dissolved in a sufficiency of ammonia solution, diluted with water to 1 pint and then filtered, gives *Liquor Bismuthi* B.P.

Since the presence of ammonium nitrate in the solution is considered to be quite unobjectionable, the following method is recommended for the preparation of "*Liquor Bismuthi*":—Bismuth subnitrate, 628.75 grains; citric acid, 571.68 grains; ammonia solution, a sufficiency; distilled water to, 20 fl. ozs. Mix the bismuth subnitrate and citric acid in a mortar with 1½ oz. of water; set aside, occasionally stirring for two hours, or until a little of the mixture yields a clear solution with ammonia. Then add a sufficient quantity of ammonia solution to dissolve, dilute with distilled water to 20 ozs., and filter.

This gives a liquor containing ammonium bismuthylcitrate equivalent to 3 grains of the oxide,  $\text{Bi}_2\text{O}_3$ , of 5 grains of the citrate,  $\text{BiC}_6\text{H}_5\text{O}_7$ , and 1 grain of ammonium citrate in each fluid drachm, the latter improving the stability of the preparation. It also contains about 1 grain of ammonium nitrate in a drachm, the presence of which has no deleterious effect on the product, medicinally or chemically, and the elimination of which necessitates the preparation of a nitrate-free citrate first, greatly increasing the labour and cost without any corresponding advantage. Those who prefer a concentrated liquor can make such in a similar way, as ammonium bismuthyl-citrate is a very soluble salt, and those who prefer alcohol as a preservative can add 1 oz. or 2 ozs. to each pint.

**Bromo and Iodo-Serum.** Buvat. (*Pharm. Zeit.*, 47, 170.) *Bromo-serum* is obtained by dissolving sodium bromide 6, sodium chloride 1.5, in water 1000. *Iodo-serum* is composed of sodium chloride 6, potassium iodide 2, sodium sulphate 2, in water 1000. Bromo-serum is employed as a sedative, and has given good results in mental diseases. Doses of 500 c.c. may be injected without any danger. Iodo-serum is also a sedative, and is useful, as well, in the treatment of syphilitic affections.

**Calcium Sulpho-Ichthyolate.** A. Hegland. (*Pharm. Zeit.*, 47, 211, after *Pharm. Weekblad.*) Ammonium sulpho-ichthyolate 100 is dissolved in water 100; separately calcium chloride 20 is dissolved in lime water 200. The latter solution is poured into the former, with constant stirring, the mixture set aside, decanted, and the precipitate thoroughly washed twice with distilled water.

It is then collected, and dried on the water bath to a chocolate-brown friable mass. It is then shaken with petroleum ether, which removes the odour and taste of ichthyol, and again dried. It may then be massed into tablets by means of 20 or 25 per cent. of cacao butter.

**Calomel Tablets, Formation of  $\text{HgCl}_2$  in.** M. Utz. (*Apoth. Zeit.*, **21**, 524.) The author has examined calomel tablets, prepared by himself, with lactose, and carefully stored, for various periods, with a view to determining the amount of  $\text{HgCl}_2$  formed in the lapse of time. Tablets containing 20 Cgm. of  $\text{HgCl}$  made in 1899, and kept in a glass corked bottle exposed to light, gave 0.61 to 0.91 per cent. of  $\text{HgCl}_2$  to the  $\text{HgCl}$  present. Some, prepared in 1900 and kept in the dark in a tin box, gave a mean ratio of 0.15 of  $\text{HgCl}_2$  to 100 of  $\text{HgCl}$ . Those made in 1901, and kept in the same way, 0.37 of  $\text{HgCl}_2$ : 100  $\text{HgCl}$ ; another lot, similarly stored for six weeks, gave 0.36  $\text{HgCl}_2$  for 100  $\text{HgCl}$ . This shows that the amount of  $\text{HgCl}_2$  increases with the age of the mixture. Since these tablets are much employed for administration to infants, who are extremely susceptible to the influence of  $\text{HgCl}_2$ , the point is deserving of attention.

**Cannabis Indica, Extract and Tincture of.** G. F. Merson. (*Pharm. Journ.* [4], **14**, 234.) Commercial extract of Indian hemp is found to be far from uniform, consisting of varying proportions of a green, ether-soluble substance and a brown extractive, insoluble in ether, but soluble in water. The latter is found to be extracted from the drug by the water in the official menstruum, alcohol 90 per cent. An extract prepared with absolute alcohol is free from this substance. It is suggested, therefore, that alcohol 90 per cent. should be discarded as the percolation menstruum for extraction, and ether or absolute alcohol substituted. Commercial extracts were found to vary in the ether soluble constituent from 100 per cent. to 46 per cent. It is obvious that the tincture prepared from such varying extracts will lack uniformity.

**Capsules for Intestinal Remedies.** (*Pharm. Era*, **26**, 625.) By immersing ordinary gelatin capsules in a 0.5 to 1 per cent. solution of acrolein for 10 to 20 minutes, they are rendered perfectly insoluble in the acid gastric secretion or in warm water, but readily dissolve in the alkaline secretion of the intestines. The process has been patented in Germany.

**Carbolic Acid Ointment.** W. Lyon. (*Pharm. Journ.* [4], **14**, 175.) The use of glycerin in this ointment is condemned, and almond oil suggested as a substitute. A basis composed of equal



parts, by weight, of almond oil, white wax and benzoated lard, is found to give satisfactory results. The lard, wax, and half of the almond oil are melted together on a water bath. The phenol is mixed in a stoppered or corked bottle with the remainder of the oil. Dissolve by immersion in hot water. Remove the melted basis from the water-bath, stir constantly until it begins to thicken, then add the phenol and oil (warm). Continue stirring until the ointment is cold. Set aside for twenty-four hours and again mix thoroughly.

**Castor Oil, Antiseptic.** F. Blowski. (*Pharm. Zeit.*, **46**, 511.) The value of castor oil as a means of removing decomposing matter from the intestines is further increased by the addition of certain antiseptic bodies, since the oil alone, although an admirable laxative, has no antiseptic action. Salol is not suitable for the purpose, on account of the large amount of phenol it furnishes in the alkaline intestinal secretion. A combination of resorcin and benzonaphthol is recommended, since the former acts as a disinfectant in the stomach, the latter in the intestines. The formula prescribed is resorcin and benzonaphthol, of each 10 or 20. Castor oil 260 or 280. It is given in the same doses as castor oil alone.

**Catgut, Sterilization of.** E. Debuchy. (*Journ. Pharm. Chim.* [6], **14**, 151.) Remove the grease from the strings of catgut by maceration in carbon disulphide, then plunge them in a 2 per cent. solution of silver nitrate and allow to macerate for 15 days. They will then become of a deep-brown colour. Then wash with sterilized salt solution until no precipitate is formed, and, finally, in sterilized water. Then heat in an autoclave not above 80°C. for an hour, or else macerate for two days in a 25 per cent. solution of cinnamon oil in alcohol, followed by several successive washings in alcohol. Finally preserve in carbolic oil, sterilized alcohol or any desired preservative solution.

**Catgut, Sterilized, Method of Preparing.** C. Arthur Ball. (*Brit. Med. Journ.* [2], **1901**, 1465). To render the inner layers of thick catgut sterile, it is necessary to subject it to heat, as an antiseptic cannot be relied on to act on more than the outer surface. Before starting to prepare any catgut it is advisable to test its strength, as occasionally a strand is found which looks all right, but is quite weak and useless for any method of preparation.

The following method of preparation has been employed with success for the last eight months on catgut up to No. 4. A glass reel is used, 1 inch in diameter and 3 in length, with a flange at

each end, each flange being pierced with a hole. A reel of *lignum vitæ* or any wood that sinks in water answers the purpose equally well. One end of the gut is tied through one hole, and the gut is wound firmly and evenly on the reel in a single layer; the other end is then passed through the other hole, and tied to the free end. The winding can easily be done with an ordinary bandage roller by placing a perforated cork in each end of the reel. The knots joining two strands together must be very carefully tied, else they will slip when boiled, and such an accident destroys the whole reel of gut by allowing it to untwist. The reel is now placed in a 5 per cent. solution of formalin, and left for about 24 hours; it is then thoroughly washed in cold water. It is next dropped into boiling water and left boiling for from 5 to 10 minutes, according to the thickness of the gut. Lastly, it is placed in the following solution: Mercury perchloride, 1 part; boiled glycerin, 250; methylated spirit, 1000; the gut is now ready, and receives no handling after sterilization until it is used.

The glycerin and spirit dehydrate the gut, the former rendering it pliable. The mercury perchloride impregnates the gut swollen by boiling with the antiseptic, and hardens it sufficiently to prevent it twisting when moistened by the tissues during the process of stitching, a difficulty with gut dehydrated by alcohol alone.

Catgut prepared in this way is undiminished in strength, and keeps well; it is pliable and knots nicely; it is absorbable (No. 0 is absorbed in about 6 days); and lastly, it is sterile.

**Ceral Paste.** Schleich. (*Pharm. Post*, **35**, 75.) Yellow wax 100 is melted on the water bath, and to it is added drop by drop with constant stirring, solution of ammonia 10 per cent. 8; and then sterilized water 150, the heating and stirring being continued until a homogeneous neutral emulsion results, in the form of a cholesterin-like mass, the addition of more melted wax or a little more ammonia being made, if necessary, to ensure neutrality. It may be made slightly alkaline, if desired, by the addition of 5 c.c. of N/100  $\text{Na}_2\text{CO}_3$  solution.

**Chloroform and Morphine, Compound Tincture of.** W. Lyon. (*Pharm. Journ.* [4], **14**, 531.) It is suggested that even if the present green tincture, which is considered to fail to replace chlorodyne in the requirements of the physician and of the public, be retained in the *Pharmacopœia*, a preparation under another

name, such as *Liquor chloroformi compositus*, should be introduced, which would more nearly meet the popular demand. Such a preparation is produced by the following formula and is miscible with water:—Chloroform, 60 c.c.; morphine hydrochloride, 5 Gm.; diluted hydrocyanic acid, 45 c.c.; tincture of Indian hemp, 80 c.c.; tincture of capsicum, 15 c.c.; oil of peppermint, 1 c.c.; mucilage of gum acacia, 120 c.c.; treacle, 240 c.c.; liquid extract of liquorice, 120 c.c.; glycerin, 210 c.c.; alcohol (90 per cent.), 154 c.c.; or sufficient to produce 1 litre.

**Coca, Fluid Extract of.** W. Garsed. (*Pharm. Journ.* [4], 14, 214.) *Determination of Total Alkaloid in B.P. Fluid Extract.* 100 c.c. was evaporated to half the bulk in a shallow dish on a water bath, at a temperature never exceeding 80°C., with constant stirring, to get rid of alcohol. When cold, the concentrated extract was made alkaline by the addition of 5 c.c. of 10 per cent. ammonia, and transferred to a separating funnel. The dish was washed out first with 45 c.c. of distilled water, then with 100 c.c. of ether. The water and ether washings were added to the rest in the separator, the whole well shaken, and allowed to stand until the ether separated, when the alkaline liquid was drawn off. The extraction with ether was three times repeated. Four ether solutions were thus obtained. The first three were mixed together, washed with a few c.c. of water containing a little ammonia, and shaken out first with 10 c.c. of 5 per cent. sulphuric acid, then twice with 5 c.c. of 1 per cent. acid. This was generally found sufficient to completely exhaust the ether solution, the test being the addition of a few drops of Mayer's reagent to the last few drops of the third quantity of acid, when, as a rule, no precipitate or opalescence was produced. The three acid solutions were mixed together, made alkaline by the addition of 10 per cent. ammonia, and three times shaken out with 10 c.c. of petroleum ether, the bulked petroleum ether extract evaporated to dryness on a water bath in a tared dish, then placed in a desiccator for some hours, and finally weighed.

*Determination of Total Alkaloid in "Miscible" Fluid Extracts.* The process followed is similar to the above, except that no evaporation is necessary, the extract being at once made alkaline with ammonia and shaken out with four successive washings of ether.

The following table gives the results of the examination of seven samples of liquid extract and miscible liquid extract. The extreme variation in the amount of alkaloid found is noteworthy.

## GRAMMES OF TOTAL ALKALOID IN 100 C.C. OF LIQUID EXTRACT OF COCA.

| Number of Sample. | B.P. Extracts. | Miscible Extracts. |
|-------------------|----------------|--------------------|
| 1.                | 0.816          | 0.014              |
| 2.                | 0.886          | 0.154              |
| 3.                | 0.868          | 0.026              |
| 4.                | 0.252          | 0.048              |
| 5.                | 0.200          | 0.294              |
| 6.                | 0.400          | 0.048              |
| 7.                | 0.240          | 0.054              |
| Average.          | 0.380          | 0.091              |

**Cod Liver Oil Emulsion.** Pierre Vigier. (*Journ. Pharm. Chim.* [6], 14, 49.) The following formula has been suggested to the Commission of the *Codex*, for inclusion in that work:—Cod liver oil, 140; simple syrup, 60; orange flower water, 40; Irish moss, 5; distilled water, q.s.; oil of bitter almonds, q.s. Mix the oil of bitter almonds, the syrup, and the orange flower water in a capacious bottle. Boil the Irish moss for twenty minutes in sufficient water to give 220 parts of decoction. Strain with pressure through a cloth, evaporate to 160. Introduce the cod-liver oil into the bottle, pour on the hot decoction and shake thoroughly. Continue the shaking for periods of five minutes, at intervals, until the emulsion is thoroughly cold. It contains 33 per cent. by weight of cod-liver oil. If glycerin be substituted for the syrup perfect keeping is assured. If desired, calcium hypophosphite may be added to the above ingredients.

**Collodion.** E. Bourquelot. (*Journ. Pharm. Chim.*, 14, 516.) It is pointed out that if nitro-cellulose be first moistened with alcohol, and then treated with ether, it is more rapidly and regularly soluble than when the gun-cotton is immersed in the previously mixed liquids. The author, therefore, suggests that the official process of the *Codex* should be altered, so that the gun-cotton 5 is introduced into a flask, moistened with alcohol 95 per cent. 20; and then ether 75 is added.

**Colloidal Mercury, Pharmacy of.** (*Merck's Report*, 1901, 102.) *Inunction*: Colloidal mercury ointment 10 per cent., for inunction, should be dispensed in small boxes, each containing 30 or 60 grains, with directions to employ one dose, by inunction, for 3 to 5 minutes. *Ointment*. Extract of opium, 3 grains; colloidal mer-

cury ointment, 310 grains; to be applied daily to the affected parts. *Pills.* Colloidal mercury, 45 grains; white bole, q.s. to make 30 pills. Coat with French chalk. One or two pills to be taken three times daily after meals.

**Colocynth and Hyoscyamus, Pill of.** W. Lyon. (*Pharm. Journ.* [4], 12, 409.) It is suggested that instead of mixing the compound pill of colocynth mass with the extract of hyoscyamus, that the powdered ingredients of the former should be rubbed down with the latter, and the mixture massed with the requisite quantity of water.

**Compressed Tablets, Preparation of.** (*Pharm. Journ.* [4], 14, 46, 64, 84, and 151.) The three main points in tablet making are (1) to regulate the pressure carefully; (2) to ensure proper cohesion of the particles of substance under compression; and (3) to prevent adhesion of those particles to any portion of the machine. To prevent adhesion to the dies a little powdered French chalk may be sifted into the material just before compression. White paraffinum molle (2 per cent. dissolved in sufficient ether) often facilitates the compression of a dry powder, and improves the appearance of the finished tablets if diffused through the granulated material, the latter being subsequently sifted and dried before compression. The rapid disintegration and solution of tablets is facilitated by adding finely-powdered starch (from one-twentieth to one-tenth the weight of material) to the granulated substance ready to be compressed. On the other hand, liquid glucose, which should be diluted with 25 per cent. of water before use, renders tablets hard and tough, so that they will not readily disintegrate. That is frequently an advantage when it is desired that the tablets should dissolve slowly in the mouth.

**Preparation of the Material.** The material to be compressed should be in a finely granular form. If in a very fine state of subdivision, it cannot be compressed satisfactorily into uniform and well-finished tablets. In such a case the fine powder must be granulated by moistening it slightly, by means of a spray, with water, alcohol, or ether. The granular product obtained by grinding crystals represents the condition which should be aimed at, powdered ammonium chloride and potassium chlorate, as supplied in commerce, being good examples of what is required. In dispensing small quantities of any powder, the material may be obtained in the desired condition by simply damping with water, alcohol, or ether, by means of an atomiser, or by rubbing it up

with a little powdered soap, and afterwards passing through a No. 20 sieve before feeding it to the machine.

With larger quantities of material, cane sugar and powdered gum are usually added, the latter being preferable, since tablets prepared with it disintegrate more rapidly. Tablets made with sugar as an adhesive are more soluble than those made with gum acacia or a mixture of gum acacia and sugar, while, as already stated, glucose serves the purpose better when a hard tablet is desired. After thoroughly mixing the adhesive substance with the medicament, sufficient water should be added to render the powder of such consistence that it can readily be shaken through a No. 12 sieve, without sticking to it or clogging the meshes. Care should be taken to add the water in small quantities at a time, and to mix thoroughly after each addition. The powder is next passed through a No. 20 sieve and dried, after which a lubricant must be added to enable the particles of powder to move freely over each other and prevent them sticking to the dies and punches.

*The Use of Lubricants.* Finely-powdered French chalk, lycopodium, powdered boric acid, or an odourless hydrocarbon oil (liquid paraffin) may be employed as a lubricant, but the better the granulated material has been dried the smaller will be the quantity of lubricant required. According to Coblenz, ten to twelve drops of liquid paraffin, added by means of a spray, is usually sufficient for each pound, French chalk, not exceeding one-fortieth the weight of material, being added after the oil. If, however, the tablets are to be dissolved, boric acid should be used as the lubricant, clear solutions being thus obtainable, though in many cases such an addition would be undesirable, as in the case of mercuric chloride, with which chemical action would take place. When the lubricant added is a powder, it should be scattered over the material spread out on paper, and the whole then lightly shaken up in a bottle. By that means the granules are not broken down and they become coated very thinly with the lubricating powder.

Ammonium chloride and other substances which are readily obtainable in the form of a fine granular powder, may be compressed into tablets without further preparation. Most other substances can be suitably granulated after being finely powdered, by adding to them 10 per cent. of their weight of powdered sugar and 5 per cent. of powdered gum acacia, while the addition to the granulated material of 5 to 10 per cent. of finely-powdered starch facilitates

rapid disintegration in the case of salol and other insoluble substances. As a rule, also, it is advantageous to pass the material twice through a sieve (usually No. 20), once directly after moistening, and again after drying the granulated powder, any granules which may adhere while moist being separated on passing through the sieve a second time, and the material being thus left in a more satisfactory condition for compression. If the addition of powdered starch or a lubricant be necessary, the twice-sifted material should be spread upon paper, the starch or lubricant scattered, or, if a liquid lubricant be used, sprayed, over the granules, and the whole then stirred thoroughly with a spatula, after which it may be lightly shaken up in a wide-mouthed bottle.

It is imperative that the granulated powder should be quite dry before compression, otherwise, as already stated, it will adhere to the dies, fail to feed regularly, and compress unevenly. As a rule, light powders such as charcoal, require no lubricant, granulation with powdered sugar sufficing to obtain them in the desired condition. In fact, the use of lubricants will often be found unnecessary, if care be exercised in preparing the materials for compression. Extracts and tinctures must be brought to the condition of a fine granular form before they can be dispensed in tablets, while salts containing water of crystallization may require to be dehydrated, and deliquescent or hygroscopic substances will need the addition of powdered gum acacia in order to render them fit for compression. Special precautions must be observed in the preparation of tablets intended for the preparation of solutions for hypodermic injection, everything being kept, as far as possible, in a thoroughly aseptic condition. Powdered sugar of milk is especially suitable as a diluent for potent remedies, and when that is used as a basis for tablets, the material to be granulated should be moistened with diluted syrup, prepared by adding two parts of recently boiled water to one part of simple syrup. Details are given of the manipulation needful in certain cases, and a full description, accompanied by illustrations of the various tablet machines in the market suitable for use in the pharmacy, concludes the paper.

**Creosote.** Legendre. (*Répertoire* [3], 14, 102). Creosote 1 Gm. is rubbed down with quicklime from marble 30 Cgm., and a drop of water. The pasty mass thus obtained is then massed with almond oil soap 40 Cgm. and sufficient inert powder to form a mass of suitable consistence, which is divided into 20 pills. These contain 5 Cgm. of creosote, and harden somewhat in

the course of a few days, but readily disintegrate in water. A softer mass, which does not harden, may be made with less lime and more soap, as follows, but the pills are larger than the above: Creosote, 1 Gm.; lime from marble, 20 Cgm.; water, 1; almond oil soap, 50 Cgm.; inert powder, q.s. to mass. Divide into 20 pills and silver.

**Crurin Injection for Gonorrhœa.** E. Jacobi. (*Deutsch. Med. Woch.*, through *Merck's Report*, 1901, 65.) Crurin, quinoline bismuth sulphocyanide, in the form of a suspension, has been successfully employed in the treatment of gonorrhœa, by urethral injection. It is thus compounded. Crurin 1, rub down with glycerin, 5; distilled water, 5; then gradually add sufficient water to bring the volume to 200. Shake well and inject two or three times daily, retaining the injection in the urethra for three to five minutes.

**Digitalis Tincture, Stability of.** J. Gordon Sharp. (*Pharm. Journ.* [4], 14, 236.) Experiments conducted by the author tend to show that tincture of digitalis is not so unstable and liable to deterioration through age as has been supposed. In one instance a specimen of tincture was found to retain its therapeutic activity unimpaired for 14 months. It is suggested that a fermentation test might be useful to determine the suitability of the leaves for pharmaceutical use. This test might be applied thus: Dissolve twenty grains of amygdalin in one fluid ounce of water, at 90°F. (37°C.). Place in a wide-mouthed bottle in a moderate temperature and set aside as a control specimen. In another bottle dissolve a similar quantity of amygdalin under similar conditions, and add to this specimen 60 grains powdered digitalis leaves. Shake up and set aside at a moderate temperature. Examine both at the end of eight hours. The plain amygdalin solution should show no change, but the specimen to which the digitalis has been added should have a bitter almond odour, and if a piece of glass have a drop of nitrate of silver solution smeared over it and then be laid over the mouth of the bottle, a white film of silver cyanide should appear in five minutes, showing the presence of hydrocyanic acid.

It is also suggested that the behaviour of the tincture towards Fehling's solution might afford a useful test. A small quantity of tincture prepared with 60 per cent. alcohol should not at once reduce Fehling's solution, and, even after a few minutes' boiling, there should not be marked reduction. This test would show that the glucosides were not decomposed. The test might be made



comparative by evaporating a given quantity of standard tincture to dryness, hydrolizing the residue and determining the amount of sugar formed by means of Fehling's reagent. By this means a good working rule could be established. Of course, a quantitative analysis with Fehling could not give the amount of digitoxin, because it is not a glucoside; but where a fair glucosidal test was obtained, a corresponding proportion of digitoxin might safely be assumed.

**Elixir' of Saw Palmetto and Santal Comp.** T. H. Haydyn. (*Amer. Drugg.*, **39**, 37.) Take of saw palmetto berries, 8 troy ozs.; corn silk, 8 troy ozs.; sandalwood, 2 ozs.; sugar, 6 troy ozs.; alcohol, water, each enough to make 32 fl. ozs. Mix 12 fl. ozs. of alcohol with 36 fl. ozs. of water. With this menstruum moisten the previously ground drugs and macerate during twenty-four hours. Then pack firmly in a percolator and pour on the remainder of the menstruum, allowing the percolate to drop slowly. In this dissolve the sugar by agitation. Finally pass sufficient water through the exhausted drugs to make the finished elixir measure 32 fl. ozs. Caramel may be added if the colour is not deep enough. Each fl. oz. of this elixir is taken to represent saw palmetto berries, 120 grains; corn silk, 120 grains; sandalwood, 30 grains.

**Essential Oils in Capsules, Method of Filling.** V. G. Toplis. (*Amer. Journ. Pharm.*, **74**, 36.) The oil is incorporated with a suitable quantity of potato starch by rubbing with a spatula on a pill tile, half a drachm of starch being employed generally, for half a fluid drachm of essential oil. The mixture is at first **very** soft, but on adding a few drops of water it rapidly becomes firmer. More water is then added until the desired consistence is attained, when the mass is divided and filled into the capsules. Arrowroot may be substituted for potato starch, but more—nearly twice the weight—is requisite.

**Formulæ, Selected from the Unofficial Formulary of the Antwerp Pharmaceutical Society.** (*Journ. de Pharm. d'Anvers*, **58**, 82.)

*Aqua Acidi Borici. Eau Boriquée.* Boric acid, 3; distilled water, 97. Dissolve and filter.

*Aqua Acidi Carbolic. Eau Pheniquée.* Phenol, 3; distilled water, 97. Dissolve.

*Aqueous Solution of Salicylic Acid.* Salicylic acid, 4; borax, 4; distilled water, 100. Dissolve with heat and filter.

*Asiatic Pills.* Arsenious acid,  $\frac{1}{12}$  gr.; powdered gum acacia,  $\frac{1}{2}$  gr.; black pepper,  $\frac{1}{8}$  gr. Mass for 1 pill.

*Camphorated Oil of Chamomile.* Infused oil of chamomile, 9; camphor, 1. Dissolve and filter.

*Condurango Wine.* Fluid extract of condurango, 50; tincture of orange, 10; Malaga white wine, 940. Mix.

*Electuarium Hiera Picra.* Powdered saffron, 10; powdered cinnamon, 10; oil of mace, 0.5; powdered aloes, 180; honey, 800. Mix.

*Emulsio Olei Morrhuæ.* Irish moss, 10; distilled water, 500. Boil gently together for 30 minutes, keeping up the quantity of water. Strain through a cloth without pressure to obtain 450 parts of strained liquid. Mix powdered gum tragacanth, 3; cod-liver oil, 500; oil of cinnamon, 0.5; oil of bitter almonds, 0.5; add to this the decoction of Irish moss and glycerin, 50. Shake vigorously to produce an emulsion.

*Gowland's Solution or Duncan's Mercurial Emulsion.* \*Mercuric chloride, 1; ammonium chloride, 2; emulsion of bitter almonds, 950; alcohol 96 per cent., 47.

*Hypodermic Injection of Caffeine.* Caffeine, 2; sodium benzoate or salicylate, 2; distilled water to produce 10 fluid parts.

*Hypodermic Injection of Quinine.* Neutral hydrochloride of quinine, 3; antipyrine, 3; distilled water to produce 10 fluid parts.

*Kola Wine.* Fluid extract of kola, 50; tincture of orange, 10; white Malaga wine, 940.

*Lassar's Chilblain Ointment.* Phenol, 2; ointment of basic lead acetate, 40; lanoline, 40; olive oil, 18.

*Lassar's Paste.* Salicylic acid, 2; precipitated zinc oxide, 25; starch powder, 25; white vaseline, 50.

*Lugol's Iodized Solution, Eau de Lugo.* Potassium iodide, 5; tincture of iodine, 20; distilled water, q.s. to make 100 parts by weight.

*Ointment of Belladonna and Mercury.* Strong mercurial ointment, 8.5; extract of belladonna, 10; water, 5. Dissolve the extract in the water and mix with the mercurial ointment.

*Pepsin Wine.* Gelatin, 0.5; water, 10; dissolve with heat, add white Malaga wine, 1000. Filter off 950, and add to it pepsin, 25; water 25; hydrochloric acid, 2.5. (N.B. For sale in the United Kingdom, without a wine licence, this formula would have to be modified by the addition of a further 10 parts of hydrochloric acid, so as to meet the requirements of the Inland

Revenue authorities that it shall contain 1:80 of strong hydrochloric acid.—*Ed. Year-Book*).

*Pierlot's Solution of Ammonium Valerianate.* Ammonium valerianate, 4; alcoholic extract of valerian, 2; distilled water, 994. Mix.

*Pills of Aloes and Iron.* Dried sulphate of iron, powdered aloes, equal parts. Mass with spirit of soap, divide into  $1\frac{1}{2}$  gr. pills and give them a brilliant black gloss by moistening with a little tincture of aloes.

*Pills of Creosote.* Creosote, 150 grs.; water, 30  $\text{m}$ . Finely-powdered liquorice root, q.s. Briskly rub down the creosote with the water, add enough powdered liquorice to mass, and divide into 100 pills.

*Pills of Mercurous Iodide. Poirier's Pills.* Mercurous iodide,  $\frac{1}{2}$  gr.; powdered liquorice root,  $\frac{5}{8}$  gr. Glycerin and extract of gentian, q.s. to mass for 1 pill.

*Pills of Potassium Iodide.* Potassium iodide, 300 grs.; starch in powder, 75 grs.; simple syrup, q.s. to mass. Divide into 100 pills, or as prescribed.

*Pills of Silver Nitrate and Morphine. Crocq's Pills.* Morphine acetate, silver nitrate, of each  $\frac{1}{8}$  gr.; kaolin,  $1\frac{1}{2}$  grs.; vaseline, q.s. to mass.

*Podophyllin Pills. Coirre's Pills. Van den Corput's Pills.* Podophyllin, 5 grs.; hard soap,  $7\frac{1}{2}$  grs.; powdered liquorice root, 5 grs.; spirit of fennel, 2 drops. Mass and divide into 10 pills.

*Sequin's Compound Wine of Cinchona.* Fluid extract of cinchona, 10; tincture of quassia, 10; tincture of opium, 3; tincture of orange, 10; white Malaga wine, 967. Mix.

*Simple Ointment.* Lanolin and white vaseline, equal parts. Unless otherwise prescribed, this is to be taken as the general ointment basis.

*Solution of Aluminium Acetate. Burrow's Solution.* (1) Lead acetate, 100; distilled water, 300. (2) Aluminum sulphate, 60, or potash alum, 66. Sodium sulphate, 10; distilled water, 500. Make each of the above with warm water; when cold, pour the lead acetate solution into that of the alum with constant agitation. Set aside for a couple of days, then filter.

*Syrup of Heroine.* Heroine hydrochloride, 0.5; distilled water, 9.5; simple syrup, 990 parts by weight.

*Syrup of Iodo-tannin.* Tannin, 2; iodine, 2; alcohol (90 per cent.), 20; distilled water, 20; simple syrup, to make 1000 parts by weight. Dissolve the iodine in the alcohol and the tannin in

the water ; mix, add the simple syrup and heat in a flask closed with an inverted funnel without boiling. Filter when the syrup no longer colours starch, add sufficient syrup to bring the final weight to 1000.

*Syrup of Lactophosphate of Lime. Dusart's Syrup.* Pure calcium carbonate, 9; acid, lactic (75 per cent.), 22.; acid, phosphoric (10 per cent.), 88; water, q.s. Dilute the lactic acid with water 108, and dissolve the calcium carbonate in it, by the aid of heat; cool, add the phosphoric acid, and then stirring well enough water to make up weight to 370. Dissolve in this liquid sugar 623, and add to the completed syrup spirit of limes 7. Mix and adjust final weight to 1000.

*Syrup of Potassio-mercuric Iodide. Gibert's Syrup.* Mercuric iodide, 0.5; potassium iodide, 50; water, 49.5; simple syrup, 900 parts by weight. Dissolve the iodides in the water, then add the simple syrup.

*Wine of Iodo-tannin.* Iodine, 1.5; tannin, 1.5; alcohol, 15; water, 15; white Malaga wine, 1000. Dissolve the iodine in the alcohol, the tannin in the water, and mix; add the wine, and heat in a flask with an inverted funnel until a portion of the wine no longer colours starch solution; cool and add sufficient wine to bring the final weight to 1000 parts.

**Galega Officinalis, Pharmacy of.** (*Journ. Pharm. Chim.* [6], 14, 480.) *Galega officinalis* has been recommended as a powerful galactagogue. It may be dispensed in one of the following forms as prescribed—

*Tincture of Galega.* Aqueous extract of galega, 1; alcohol (30 per cent.), 10. Dissolve and filter. Dose: 3 to 6 tablespoonfuls per diem in aromatic water, after meals.

*Syrup of Galega.* Aqueous extract of galega, 50; distilled water, 50; simple syrup, 950; tincture of fennel, 25. Dissolve the extract with the water in the cold, filter, mix with simple syrup, 200; evaporate off the water, 50; add the rest of the syrup and then the tincture. Each tablespoonful contains 15 grs. of extract. Dose: 1 tablespoonful 3 times a day in aromatic water.

*Elixir of Galega.* Tincture of galega, 20; simple syrup, 8; tincture of fennel, 3. Mix. Dose: 1 liqueur glassful 3 times a day after meals.

**Gelatin as a Pill Excipient.** G. Roe. (*Chem. and Drugg.*, 57, 1044.) A solution of gelatin in glycerin and water is recommended as an excipient for massing substances which tend to liquefy—essential oils, creosote, carbolic acid and similar substances,

with the aid of an absorbent powder. The excipient is prepared from gelatin, 5vj.; glycerin, 5ij.; water, a sufficiency. The gelatin is tied in a bundle and soaked in warm water for a few minutes, drained, placed in a porcelain capsule, and dissolved with the glycerin by placing over hot water; then poured into a wide-mouthed bottle, and kept on the dispensing-counter ready for use. As an example of how this excipient can be used, the following prescriptions were taken: Acid. carbolic, gr. j.; menthol, gr.  $\frac{1}{4}$ ; acid. salicylic, gr. iij. Ft. pil. Mitte xxiv. Carbolic and menthol liquefy when mixed; the ordinary excipients make too large a pill. By carefully melting a few grains of the above stiff jelly on a small slab, adding the menthol and carbolic acid, well mixing, and finally massing with the salicylic acid, some calcium phosphate and fullers' earth, a very satisfactory pill was made. Acid. carbolic, gr. xij.; pulv. tragac., q.s.; sapo. alb., q.s.; tritici farinæ, q.s.; massæ gelatinæ, q.s. Ft. pil. xij. This made 12 pills, weighing in all 36 grs. Acid. carbolic, gr. xij.; ol. cajuputi, ℥xij.; pulv. glycyrrhiz, q.s.; cimoliæ terræ, q.s.; massæ gelatinæ, q.s. Ft. pil. xij. Total weight, 57 gr. Creosoti, ℥xij.; cimoliæ terræ, q.s.; pulv. saponis, q.s.; massæ gelatinæ, q.s. Ft. pil. vj. Total weight, 34 gr. Salol and menthol, phenol and menthol, and such like, which liquefy when mixed, can be successfully made into pills in a similar manner. The pills retain their shape well on keeping.

**Gentian, Extract of.** H. G. Greenish and W. H. Lenton. (*Pharm. Journ.* [4], 14, 219.) As a result of their experiments the authors conclude:—(1) That the official method of treatment does not sufficiently exhaust the gentian root of its bitter principle. (2) That the boiling to which the root is subjected is disadvantageous in that a larger amount of pectin is dissolved than when cold extraction is used. (3) That extraction with cold water is preferable, two successive infusions being necessary. The method official in the German Pharmacopœia possesses certain advantages over that of the British Pharmacopœia, inasmuch as the drug is exhausted by cold infusion; by this process the bitter principle is more efficiently extracted, while less pectin is dissolved, and a better extract is obtained. At the same time, the relatively small advantage gained by the addition of alcohol to the concentrated infusions does not appear to justify the adoption of this part of the German process. (4) That although 45 per cent. alcohol thoroughly exhausts the bitter principle, the extract obtained on evaporation of the tincture has the disadvantage of being hygroscopic. (5) That the exhaustion of the

root with cold water proceeds slowly. (6) That the infusions obtained from the whole root by the cold extraction process filter more readily than when the sliced root is used. (7) That gentian root is not, in their opinion, well adapted for percolation with water. The subjoined new monograph was submitted for consideration, with a view to its inclusion in the next edition of the British Pharmacopœia:—*Extractum Gentianæ*. Infuse gentian root in five times its weight of distilled water for forty-eight hours; pour off the infusion; press the marc; strain the expressed liquid; mix the liquids, and concentrate them to one-third their volume; filter when cold. Infuse the marc for twenty-four hours with a further quantity of distilled water equivalent to three times the weight of gentian root taken; repeat the process of decantation, expression, concentration, etc. Mix the two concentrated liquids and evaporate to the consistence of a firm extract.

**Glucose Syrup, as a Pill Excipient.** W. Lyon. (*Pharm. Journ.* [4], 12, 408.) In seven out of nine of the pill masses in which syrup of glucose is prescribed, in the Pharmacopœia, as the excipient, it gives good results, the mass formed rolling well, the pills being of small bulk, not falling, and yet not becoming hard. The two pill masses in which it fails to give good results are pill of aloes and myrrh, and compound pill of galbanum. In the former case the mass lacks coherence; the addition of one per cent. of tragacanth gives it the necessary plasticity. The compound pill of galbanum massed with syrup of glucose is a complete failure, not however so much from the excipient as from the nature of the mass. A batch of pills prepared without any excipient at all were found to be equally devoid of stability of form. No satisfactory excipient giving permanently spherical pills was found. It is suggested that the freshly crushed ingredients should be administered in the form of tablets.

**Glycerophosphates, Compound Syrup of.** Siboni. (*Formulary Bull. gen. de Therapeut.*, 143.) Dissolve calcium glycerophosphate, dried at 110–120°C., 27·4 Gm. in lactic acid, 8·8 Gm.; and water, 250 Gm. Dissolve separately sodium sulphate, 4·04 Gm.; potassium sulphate, 2·07 Gm.; iron sulphate, 4·66 Gm.; quinine sulphate, 4·10 Gm.; strychnine sulphate, 42 *millegrammes* in 100 c.c. of water, and mix with the first solution. Allow to stand for 24 hours, filter off the separated calcium sulphate, dissolve in the filtrate, sugar 775 Gm. and add sufficient water to make the final volume 1000 c.c. Each 10 c.c. of the syrup

contains 5 Cgm. of neutral calcium glycerophosphate, as well as the acid glycerophosphates of sodium, potassium, iron, quinine and strychnine, and 10 Cgm. of calcium lactate.

**Glycosal, Pharmacy of.** (*Merck's Report, 1901, 94.*) Glycosal, or mono-salicylic glycerin ester is a white crystalline powder, melting at 76°. It is only soluble to the extent of 1:100 in cold water, but is readily dissolved on warming. It is also freely soluble in alcohol. It is chiefly employed as a remedy for rheumatism.

**Glycosal Powders.** Glycosal should be dispensed in 8 grain powders in cachets or wafers. One such powder, followed by a draught of mineral water, repeated every 130 minutes to 3 hours until perspiration commences.

**Glycosal Pigment.** Glycosal, 1; alcohol, 4. To be applied with a brush to the affected part. In this form it is readily absorbed by the skin.

**Glycosal Enemata.** Glycosal, 60 to 150 grains; mucilage of acacia, distilled water, of each 3½ fl. oz. Tincture of opium, 5 to 20 drops. Mix. One half to be used as an enema.

**Glycerin Soap Paste.** (*Nat. Drugg., 32, 41.*) A glycerin soap paste, that serves as a base for preparing medicinal soaps, is made, according to the *Monatsheft für praktische Dermatologie*, as follows: Medicinal soap, powdered, 2 parts; tragacanth, powdered, 1; glycerin, 5; distilled water, 20. Mix and make into a paste.

**Glycogenal, Pharmacy of.** (*Merck's Report, 1901, 91.*)

**Glycogenal Powders.** Glycogenal, 15 to 23 grains; ammonium carbonate, ¼ grain. Mix. One powder to be taken in the morning, fasting. Breakfast should not be taken for 2 hours after the powder and no liquids should accompany the meal. Rœrig finds that these powders may be used in place of the hypodermic injection of glycogenal.

**Suppositories of Glycogenal.** (a) Glycogenal, 5 grains; glycerin, 8 minims; cacao butter, q.s. to form a suppository. Two such suppositories to be used daily. (b) Glycogenal, 5 grains; sodium glycocholate, 3 grains; cacao butter, sufficient to form a suppository. One such to be used daily.

**Glycogenal Mixture.** The following is recommended in scarlet fever: Glycogenal, 1; glycerin, 3; distilled water, 50 parts by weight. A dessertspoonful every one or two hours.

**Glycogenal injection** for suppuration of the ears, dental fistulæ, etc. Glycogenal, 1; glycerin, distilled water, of each 40 parts by weight. The ear should first be cleansed with a douche of warm water.

**Granules, Pharmaceutical, Preparation of.** M. Adrian. (*Nouveaux Remèdes*, through *Répertoire* [3], **13**, 441.) Four kinds of granules are met with in pharmacy—round, paste, effervescent and coated.

*Round Granules.* For these, the preparation known on the Continent as “Seidlitz granulé,” may be taken as a type. They are thus prepared: Nonpareil sugar, 5; powdered tartaric acid, 3·7; sodium bicarbonate, 3; dried and powdered magnesium sulphate, 30; syrup, sp. gr. 1·286, 12·5. The sugar is spread out on a flat bottom swinging dish, suspended so that it may be rapidly turned from side to side with one hand. It is then moistened with a portion of the syrup, being well rubbed with one hand while the dish is twisted about with the other. When the particles of sugar are evenly moistened, some of the magnesium sulphate is sprinkled over them and they are again rubbed with the hand until a uniform mixture results. This is then dried in a stove. When dry, the granules are again put in the swinging dish, moistened with more syrup, sprinkled with the tartaric acid, and again dried. The process is repeated with the sodium bicarbonate, the magnesium sulphate being gradually worked in with each lot, employing, in each case, more of it than of the other powder added. As the granules increase in size the smaller grains are sifted out and treated separately until the whole batch assumes the uniform appearance and size of millet grains. They are then finally dried.

In the case of powdered drugs these are first mixed with icing sugar before sprinkling on the nonpareil sugar, so that the final product contains 50 per cent. of the active ingredient.

*Paste Granules.* In these the active ingredient is intimately mixed with icing sugar and massed to a paste with syrup, sp. gr. 1·286. The paste thus obtained is rubbed through a sieve of suitable mesh, and dried.

*Effervescent Granules.* For these, granules of lithium carbonate may be taken as the type. Lithium carbonate, 1·2; citric acid, 4·8; sodium bicarbonate, 6 are intimately mixed and heated in a suitable dish over the water bath. When fusion commences the mixture is well rubbed with the hand and passed through a sieve; the granules thus formed are dried in the stove.

*Coated Granules.* These are generally prepared with solution of vegetable extracts such as those of kola, coca, maté, tea, coffee, etc. Coarse grained crystalline sugar is put in the swinging dish and moistened with a suitable quantity of the alcoholic or aqueous solution of the extract. The mixture is rubbed with the hand



until evenly moistened, but without moving the dish, so that the grains do not roll over each other. They are then dried and sifted again into the swinging dish, moistened afresh and dried, the operation being repeated until all the medicament has been used up. They are then finally dried and sifted.

**Hæmatin Product, Method of Preparing.** Torald Sollmanns. (*Amer. Journ. Pharm.*, **74**, 275.) Defibrinated ox blood, 1,000 c.c.; pepsin, U.S.P., 1.5 Gm.; dilute hydrochloric acid, U.S.P.; T. S. sodium carbonate, U.S.P., thymol, of each a sufficient quantity to make 18 to 30 Gm. of hæmatin.

1. To the blood add 2,000 c.c. of dilute hydrochloric acid and 0.5 Gm. of pepsin. Pour into large bottles, which should be a fourth filled. Add to each bottle a small crystal of thymol (the size of a split pea) and set the bottles in a large water bath, which is kept at a temperature of 40°C., for twenty-four to thirty-six hours.

2. Render the contents of the bottles just neutral to litmus by the sodium carbonate solution. Fill the bottles with cold water and let them stand in a cool place until the precipitate has settled.

3. Carefully decant the supernatant liquid, leaving the precipitate and adhering liquid in the bottles. Again fill the bottles with water, let settle, and decant. To the washed and moist precipitate in the bottles add now enough of a mixture of 40 c.c. of diluted hydrochloric acid, 0.5 Gm. of pepsin, 960 c.c. of water, to a third fill the bottles; add to each a small crystal of thymol, and digest at 40°C. for twenty-four hours. Then proceed by 2 (above). Decant a little of the clear liquid into a test-tube, and add an equal volume of soda solution and a drop of T. S. cupric sulphate. If this produces a pink colour, repeat 3 (above). If the colour is blue, proceed by the next paragraph.

4. Decant the liquid from the precipitate as completely as possible. Fill the bottles containing the moist precipitate with cold water, let settle, decant, and repeat this until the washings give only a faint turbidity with acidulated silver nitrate solution. When this stage has been reached, pour the precipitates into a large evaporating dish, dry on a boiling water bath, and powder.

The yield varies from 1.8 to 3 per cent. of the blood employed. The product forms a black, granular, non-hygroscopic powder which is odourless and practically tasteless. It dissolves slowly in 1 per cent.  $\text{Na}_2\text{CO}_3$  solution and in 0.2 per cent. HCl solution; these solutions are turbid reddish brown, and give the characteristic hæmatin spectra. Strong NaOH solutions are dichroic.

The HCl solutions do not give any reaction with  $K_4FeCy_6$ , showing the absence of inorganic iron. By carrying the digestion further, so as to convert all the acid albumin into albumose, a purer hæmatin may be obtained.

**Hyoscyamus, Tincture of the Fresh Herb.** John Barclay. (*Chem. and Drugg.* 30, 893.) Two experimental lots of tincture were made, the process in each case being identical, but the herb in sample No. 2 (see below) being more leafy and better grown than in No. 1. One pound of the fresh herb, consisting of stalks and leaves, was, after being thoroughly crushed, macerated for about ten days in a pint of 90 per cent. alcohol. The tincture was then strained from the marc, and the latter treated with 4 fl. ozs. of distilled water, after which it was again closely pressed. As a result two lots of tincture, each measuring  $33\frac{1}{2}$  fl. ozs., and weighing 2 lbs., were obtained. The tinctures proved to have the following characters:—

*Tinctures from Fresh Herb.*

|                                    | No. 1<br>(Plant stalky). | No. 2 (Plant<br>well-grown<br>and leafy). |
|------------------------------------|--------------------------|-------------------------------------------|
| Sp. gr. 15.5°C.                    | 0.949                    | 0.948                                     |
| Total solid matter dried at 100°C. | 2.23                     | 2.82                                      |
| Total alkaloid by titration        | 0.0075                   | 0.0097                                    |

The tincture prepared by the official method from dried drug of good quality gives figures of which the following may be taken as fair averages:—

*Tincture Prepared by Official Method.*

|                             |       |
|-----------------------------|-------|
| Sp. gr.                     | 0.957 |
| Total solid matter          | 3.00  |
| Total alkaloid by titration | 0.008 |

A comparison of these figures shows that in the tincture from the fresh herb the proportion of alkaloid to total dissolved matter is considerably higher than is the case with the official preparation. It may be noted, too, that the "fresh" tincture is superior in both aroma and in colour to the "dried" preparation.

**Ichthosin.** Hugo Goldschmidt. (*Oester. Zeits. für Pharm.* 39, 737.) Under this name an aqueous solution of ichthyol and eosin is employed to impart a flesh colour to various ointments. By slightly varying the proportion of eosin any desired shade of flesh colour may be obtained. About five drops of the solution is generally sufficient for 10 Gm. of ointment or paste. If the very

slight odour of ichthyol is objected to, this may be covered by the addition of a drop or two of bergamot oil. Ichthosin may be also used for colouring dusting powders, about twenty drops to 5 Gm. of the powder being sufficient. It is prepared in five tints, numbered according to the depth of the eosin colour.

**Incompatibility of Magnesium Sulphate, Phenazone, and Sodium Salicylate.** J. P. Gilmour. (*Pharm. Journ.* [4], 14, 22.) The above-named substances when present together in aqueous solution are found to be incompatible, a crystalline compound containing magnesium, salicylic acid and phenazone separating out in a longer or shorter period, according to the strength of the solution and the temperature to which it is exposed. The addition of a considerable quantity of glycerin does not appear to prevent the separation of this crystalline body. The crystals appear to be radiating hexagonal prisms, neutral in reaction, sparingly soluble in cold water, and insoluble in alcohol, ether and chloroform.

**Inhalation for Bronchial Cough and Coryza.** (*Journ. Pharm. Chim.* [6], 15, 96.) Menthol, 1; eucalyptol, 1; thyme oil, 5; lavender oil, 5; tincture of tolu, 10; alcohol 90 per cent., 100. A teaspoonful of this mixture is poured into a jug of boiling water and the vapour inhaled.

**Iodine Leaf or Iodine Paper Plaster.** L. Tixier. (*Pharm. Centralt.*, 42, 582.) A convenient and portable means for the local application of iodine consists of two sheets of filter paper, one saturated with a solution of potassium iodide and iodate, and dried, and the other with potassium acid sulphate. When these are moistened and applied to the skin a considerable amount of iodine is liberated. The papers are thus prepared: Iodine, 50 Gm., and caustic potash solution (sp. gr. 1.336), 80 Gm., are heated together, evaporated to dryness, then made up to 500 Gm. with distilled water, filtered, and the solution kept in a well-closed, yellow-glass bottle. The acid solution is made by dissolving potassium acid sulphate, 1; in distilled water, 8. Similar sizes of filter paper are immersed in these solutions and dried, separately, at a gentle heat. When dry, a sheet of plain filter paper is laid between each iodide and acid paper, and the edges of three sheets fastened together with a mixture of paraffin oil, 2; prepared chalk, 2; resin, 1; oil of turpentine, 1. The sheets are then wrapped in gutta-percha tissue to keep them from the damp. Before applying, the sheet is moistened in a plate of water, drained, and applied to the skin over the affected part, and covered with oiled silk, or bound on with a bandage. The application for fifteen minutes has

the same effect as a mustard leaf; applied for twenty-five minutes the result is equal to two or three paintings with tincture of iodine; for twenty-five to forty-five minutes the effect is that of thapsia plaster or strong iodized wool. In one hour the action is vesicant. The slight pain occasioned by the application disappears in ten minutes after the removal of the papers.

**Iodized Cotton.** E. Bourquelot. (*Journ. Pharm. Chim.* [4], 14, 516.) The following method has been adopted by the Commission of the *Coder* for inclusion in the next issue of that work. Raw carded cotton, dried at 30°C., 25 Gm.; finely-powdered iodine, 2 Gm. Take a wide-mouth stoppered flask of 1 litre capacity; heat it, unstoppered, over boiling water for several minutes to drive out a portion of the air. Sprinkle the iodine as evenly as possible over the cotton, and introduce it into the flask; replace the stopper and keep the flask immersed in boiling water up to the neck, or plunge the whole into a steam bath at 100°C., for two hours. Cool before removing the stopper. The cotton thus prepared should contain not less than 4 per. cent. of available iodine, which is directed to be determined by macerating a known weight of the cotton for 1 hour, with agitation, in a known volume of N/10 thiosulphate solution; and then titrating back the unused thio. in an aliquot part of the filtered solution against N/10 iodine solution. It is essential that the body of the flask should be entirely immersed in the boiling water or the resulting cotton will be deficient in iodine. The amount of available iodine is found to vary from 4 to 5 per cent., the rest being combined with the cellulose in intimate combination. It is not practicable to increase the amount of iodine, since cotton containing more is found to stain the fingers, the iodine not adhering properly to the fibres. If kept in well-stoppered bottles, the iodized cotton thus prepared appears to be permanent, no loss of iodine being observed in three months.

**Iodoform, Pharmacy of.** E. Desesquelle. (*Rev. Pharm.*, 11, 12.) One part of iodoform is soluble in ether, 6; boiling alcohol 90 per cent., 12; gold alcohol 90 per cent., 80; chloroform, 14; carbon disulphide, 3.3; camphorated  $\beta$ -naphthol, 14; olive oil, 30; saturated solution of camphor in olive oil, 16; liquid vaseline, 40. Various substances have been suggested to mask the odour of iodoform. The following bodies are suitable, in the proportions given, to cover the odour of 10 Gm. of iodoform, without throwing out when that compound is dissolved:—Oil of cinnamon, 50 drops; oil of eucalyptus, 50 drops; oil of peppermint, 20 drops; oil

of geranium, 50 drops; crystalline phenol, 1 Gm.; camphor, 5 Gm.; menthol, 50 Cgm. Calomel and alkalis, and preparations of methylated alcohol are incompatible with iodoform. External applications of iodoform comprise:—

*Iodoform Collodion.* Iodoform, 1; flexile collodion, 9.

*Iodoform Ether.* Iodoform, 4 to 20; ether, 100.

*Iodoform Oil.* Iodoform, 1; sterilized olive oil, 30.

*Iodoform and Camphorated  $\beta$ -Naphthol.* Camphorated beta-naphthol, 14; iodoform, 1.

*Iodoform Ointment.* Iodoform, 4; vaseline, 30 to 100 Gm. To obtain a perfectly homogeneous ointment, the iodoform should first be dissolved in a little  $CS_2$ , mixed thoroughly with the vaseline, and the solvent driven off by means of a gentle heat.

*Iodoform Suppositories.* Iodoform, 10 to 20 Cgm.; cacao butter, 2 to 3 Gm.

*Iodoform Varnish.* Iodoform, 10; ethereal tincture of benzoin, 90.

For internal use the following may be employed:—

*Capsules of Iodoform and Guaiacol.* Crystalline synthetic guaiacol, 10 Cgm.; oil of sweet almonds, 5 Cgm.; iodoform, 2 Cgm. for each capsule. Creosote may be compounded in similar proportions.

*Iodoform Oil.* Iodoform, 2 Gm.; oil of sweet almonds, 1,000 Gm.; oil of cinnamon, 30 drops.

*Iodoform and Cod-liver Oil.* Iodoform, 2 Gm.; cod-liver oil, 1,000 Gm. A tablespoonful of either of these two preparations contains 3 Cgms. of iodoform. Guaiacol, creosote, eucalyptol, etc., may be added to these preparations, as prescribed. They may be flavoured with peppermint or any other volatile oil, as required.

**Iodoform Oil, Sterilized.** A. Ten Bosch. (*Annales de Pharm.*, 8, 8, after *Pharm. Zeit.*) Iodoform, 10 Gm., is introduced into a brown glass bottle having the capacity of about 120 c.c., then about 60 c.c. of a one per mille solution of  $HgCl_2$ . The mixture is shaken up so as to sterilize the iodoform; olive oil, 3 Gm., previously sterilized by heat, is then added, and the mixture is again shaken up. It is then allowed to separate, the aqueous layer decanted, the bottle being thoroughly drained from the last traces of aqueous solution. Sterilized olive oil, 87 Gm., is then added to complete the preparation.

**Iodo-tannin Preparations.** O. Van Schoor. (*Journ. Pharm. d'Anvers*, 58, 1.) *Iodo-tannin Syrup.*—Iodine, 2; tannic acid,

2; alcohol, 20; distilled water, 20; simple syrup, 1,000. Dissolve the iodine in the alcohol, and the tannin in the water; mix; add the syrup; warm in a stoppered flask, when there is no longer any reaction with starch, filter; if necessary, add sufficient distilled water to produce 1 kilo. of syrup.

*Iodo-tannin Wine*.—Take iodine, 1·50; tannin, 1·50; alcohol, 15; sweet wine, 1,000. Prepare in the same manner as directed for the syrup.

**Iron Pill, Modification of the Official Formula for.** W. Lyon. (*Pharm. Journ.* [4], 12, 601.) Instead of using the 150 grains of syrup and 20 grains of water, to mass, as directed in the official formula, it is suggested that 130 grains of powdered sugar and 40 grains of water should be employed. The mass thus obtained may be rolled at once instead of being set aside for some time before it can be made into pills.

**Lecithin, Pharmacy of.** (*Merck's Report*, 1901, 121.) *Lecithin Pills*. Lecithin, 75 grains; marsh mallow root powdered, alcohol, glycerin, a sufficiency to make 50 pills. Coat with lycopodium. One pill to be taken three times daily before meals.

*Lecithin Injection*. Lecithin, 8 grains; olive oil washed in alcohol and sterilized, 160 m. 1-3 c.c. to be injected on alternate days.

*Lecithin Suppositories*. Lecithin, 1½ to 8 grains; cacao butter, 32 to 45 grains. Prepare as a suppository. Administer one such daily.

In veterinary surgery Fambach has applied lecithin for the treatment of encephalitis and epidemic cerebro-spinal meningitis in horses, and describes it as the only remedy available for the treatment of these diseases, which hitherto have been regarded as incurable. He also recommends the subcutaneous injection of lecithin in doses of 8 grains. For this purpose it is dissolved in a minimum of alcohol (6-10 drops) and added immediately before injecting to 5½ fl. drs. or 1 fl. oz. of physiological sodium chloride solution. This causes the lecithin to precipitate in flakes remaining in suspension. This diluted alcoholic suspension should be injected. As an alternative, a suspension of lecithin in physiological salt solution may be employed. These injections may occasionally give rise to œdema, which is, however, free from danger, but should be protected from pressure. Fambach likewise advocates the use of lecithin for the treatment of tetanus, lyssa, the nervous form of distemper, polyuria, and

influenza, and further recommends it for improving the state of nutrition of all horses and foals reduced by disease.

**Lecithin Syrup.** (*La Médecine Moderne*, through *Amer. Drugg.*, 40, 40.) Yolk of egg, 10 ozs.; water, 2 ozs. This should be beaten and strained. The following is then added and dissolved while cold:—Sodium chloride, 3 drs.; sugar, 6 ozs.; cherry-laurel water, 2½ ozs.; glycerin, 10 ozs.

**Lenigallol Pastes.** (*Merck's Report*, 1901, 122.) In the treatment of eczema and other inflammatory skin diseases, one of the following formulæ may be prescribed:—*Simple lenigallol paste*: Lenigallol, 2; zinc paste, 8. To make a paste. *Lenigallol tar-paste*: lenigallol, 10; cade oil, 5; zinc paste, 85. Prepare as a paste. *Wilkinson's lenigallol paste*: Lenigallol, 1; Wilkinson's ointment, 9. Prepare as a paste.

**Linimentum Salicylatum Aromaticum.** Bourget. (*Pharm. Centrall.*, 43, 174.) The following liniment is prescribed by Bourget for the treatment of influenza. It is applied to the chest and back, the patient being kept in bed:—Salicylic acid, 4; methyl salicylate, 10; eucalyptus oil, 5; sage oil, 3; oil of mace, 5; camphorated oil, 30; spirit of juniper, 120.

**Liquor Antisepticus.** H. P. Hynson. (*Amer. Drugg.*, 39, 201.) Acid benzoic, 8.25 parts; sodium borate, 8.25 parts; acid boric, 16.5 parts; thymol, 2.5 parts; alcohol, 180 fluid parts; eucalyptol, 1.5 fluid parts; oil of spearmint, 0.25 fluid parts; precipitated calcium phosphate, 10 parts; menthol, 0.75 parts; oil wintergreen, 1.5 fluid parts; caramel, q.s.; water, enough to make 1,000 fluid parts. Dissolve the benzoic acid, thymol, eucalyptol, oil of wintergreen, oil of spearmint and menthol, in the alcohol and mix with the precipitated calcium phosphate. Dissolve the sodium borate in 400 fluid parts of water. Mix together the alcohol mixture and aqueous solution and enough water to make 1,000 fluid parts, and filter. Colour with caramel, a light yellowish brown.

**Manganese Saccharate.** F. Gouillon. (*Bull. Comm.*, 14, 33.) For the administration of manganese in a soluble and fairly constant form, the following method is employed to produce a stable syrup of definite strength in manganous oxide. To 10 parts of crushed white sugar, contained in a closed vessel, 3 parts of solution of potassium permanganate, 3 in 100, is added, and the mixture allowed to stand, in the cold, for three or four days with occasional agitation. Another 3 parts of permanganate solution is then added, the agitation and maceration being repeated. In a few days the precipitate at first formed will be redissolved and a clear, permanent

syrup obtained containing 0.5 per cent. by weight of manganous oxide. If required, by doubling the strength of the aqueous manganese solution, this strength of the syrup may be proportionately increased.

**Medicated Lozenges.** Sir James Sawyer. (*Brit. Med. Journ.* 2, 1901, 1594.) The author advocates the prescribing of lozenges in certain cases, and recommends as a basis the *Pasta glycyrrhizæ alba*, which is thus prepared:—Take of decorticated liquorice root  $\bar{\text{z}}$ iv., water Oiv.; macerate for 12 hours; strain and add lb. ijss. of picked gum arabic and lb. ijss. of refined sugar; dissolve, strain and evaporate to the thickness of honey, constantly stirring, and add gradually the whites of 12 eggs well beaten with  $\bar{\text{z}}$ iv. of orange flower water; evaporate with constant stirring till the paste is so firm as not to adhere to the hands.

If the physician decide upon the exhibition, in a given case of illness, of a remedy in the vehicular form of a lozenge, the particular drug or drugs therapeutically indicated for this purpose in the particular case should be selected with a prescriber's usual care, and prescribed with the *pasta glycyrrhizæ alba*. The active drug or drugs should be skilfully combined by the dispenser, *secundum artem*, with the basis in the process of the making of that basis at a time before the paste attains its final consistence. For example, borax is an excellent local subastringent, detergent, and antiseptic. A lozenge of it may be prescribed magisterially as follows:—Boracis gr. ij., pastæ glycyrrhizæ albæ gr. x.; misce, fiat trochiscus. Signetur: one or two to be slowly sucked, as directed. A lozenge of borax so made is "nice" enough to be agreeable without being quite a sweetmeat. When freshly made it dissolves slowly and well in the mouth, and it is tough enough to be in part a masticatory.

[The above formula for *Pasta glycyrrhizæ alba* is not very clear. Probably the white of egg is intended to be used solely as a clarifying agent; the mixture should, therefore, be strained after the addition of the egg albumin. A more recent and definite recipe for a similar preparation will be found in the *Pasta Liquiritiæ* of the *Arzneimittel*.—ED. Year-Book.]

**Mercuric Chloride Solutions, Preservation of.** H. G. Greenish and F. A. Upsher Smith. (*Pharm. Journ.* [4], 14, 215.) An investigation was undertaken to determine if solution of mercuric chloride undergoes any change when kept; to what extent this change, if any, is modified by the nature of the bottle



in which it is kept, by the nature of the light to which it is exposed, or by the nature of the solvent. Also what is the nature of the change. It was found (1) That solution of mercuric chloride in distilled water will keep satisfactorily in white, green or blue bottles for a reasonable length of time if not exposed to direct sunlight. (2) That even in direct sunlight it will keep, if protected by the use of amber glass; the use of bottles made of such glass is therefore recommended. (3) That the ordinary white glass bottles, from whatever source, do not appreciably differ in their action. (4) That the minute deposit gradually formed is partly or wholly mercurous chloride. (5) That mercuric chloride gives with tap water a copious precipitate in blue, green, or white glass bottles; the precipitate will not form, however, in amber bottles or in darkness. (6) That in diffused light amber bottles preserve the solution better than blue, green or white bottles. (7) That in strong light the amber glass alone is satisfactory. (8) That strong light effects more decomposition than diffused light, especially with tap water.

**Mercuric Nitrate Ointment.** P. W. Squire. (*Pharm. Journ.* [4], 14, 314.) The author maintains that the ointment prepared by the modifications of manipulation suggested by him (*Pharm. Journ.* [4], 4, 173) is superior to that obtained by the official process. In the author's method the melted fats and mercuric nitrate solution are mixed at between 80 and 90°C. and the mixture, heated on the water bath, after effervescence has continued for 10 minutes, is removed from the heat and stirred until cold. The statement that this method gives an unduly acid ointment is shown to be groundless, while there is less tendency to produce a "spongy" ointment, and the product keeps well; experimental batches prepared four years ago still retaining the original "citrine" colour, while other lots prepared at the same time by other modifications of the process have become, without exception, black and decomposed.

**Mercuric Oxide, Red, Ointment of, and of Ammoniated Mercury.** W. Lyon. (*Pharm. Journ.*, 13, 600.) The official basis is considered to be unsuitable for the direct application of these ointments in the manner in which they are generally employed. As a substitute the petroleum ointment of the previous edition of the London Hospital Pharmacopœia (yellow wax, 30 grains; vaseline, 1 oz.) is recommended; or wool fat, 1, soft paraffin, 2; or hard paraffin, 1, and soft paraffin, 7.

**Mercury Benzoate Injections in the Treatment of Syphilis.** Emery. (*L'Union Pharm.*, **43**, 64.) The first injections of mercuric benzoate were prepared according to the modified formula of Stoukowenhoff-Balzer:—Mercuric benzoate, 30 Cgm.; pure sodium chloride, 30 Cgm.; cocaine hydrochloride, 15 Cgm.; sterilized distilled water, q.s. to produce 30 c.c. Each c.c. = 1 Cgm. of the benzoate. It is pointed out that the salts in this mixture undergo double decomposition, and that the patient receives an injection of mercuric chloride and benzoate and chloride of sodium. Bretonneau therefore modifies the formula, substituting neutral ammonium benzoate for the sodium chloride, thus:—Mercuric benzoate, 30 Cgm.; ammonium benzoate neutral, 1.5 Gm.; sterilized distilled water, q.s. to 30 c.c. Gaucher points out that commercial mercuric benzoate is rarely pure; he therefore recommends the extemporaneous preparation of the salt by treating yellow mercuric oxide, dissolved in acetic or nitric acid with sodium benzoate. Finally he has modified the formula of the injection thus:—Mercuric benzoate, 30 Cgm.; ammonium benzoate, 50 Cgm.; cocaine benzoate, 7 to 15 Cgm.; sterilized distilled water to 30 c.c. The daily dose of either of these injections is 2 c.c. The last modification of Gaucher is stated to be better borne than the others. Desesquelle states that these injections are rapidly efficacious in the treatment of syphilis, but occasion local nodular indurations.

**Methyl Salicylate, Pharmacy of.** (*Bull. Gén. de Therap.*, **143**, 292.) *Liniments.* (1) Methyl salicylate, 2; balsamum tranquillans, 5. (2) Methyl salicylate, 2; camphorated oil of chamomile, 5. (3) Methyl salicylate, 2; chloroform, 1; compound wine of opium (Codex), 1; oil of hyoscyamus, 8. *Embrocation.* Methyl salicylate, 1; compound alcoholate of turpentine (Codex), 8. *Ointments.* (1) Yellow wax, 3; lard, 5; methyl salicylate, 2. (2) Lanolin, 2; vaseline, 1; methyl salicylate, 1.

**Microcidine Antiseptic Ointment.** (*Bull. Gén. de Therap.*, **143**, 152.) Microcidine, 3; oil of geranium, 2.5; oil of thyme, 2.5; oil of marjoram, 2.5; oil of verbena, 2.5; white vaseline, 1,000. This ointment is a true antiseptic and is non-irritant, favouring the formation of the epidermis, which powerful antiseptics, such as iodoform and sublimate, prevent. It is specially useful as an application to extensive burns.

**Myelocene, or Bone Marrow, for Deafness of Middle Ear Origin.** Chalmers Watson. (*Brit. Med. Journ.* [1], **1902**, 699.) The following instructions are given for the preparation of myelocene,

or bone marrow, for use in the treatment of deafness arising from middle ear disease.

Perfectly fresh bones are obtained from the butcher. In these bones the epiphyses are present, for the custom of that trade is to kill feeding stock when about two years old.

The first task is to select bones in which the marrow will be suitable for the internal treatment of the ear. When examined with the naked eye the marrow is found to vary in appearance and consistence within wide limits. Hundreds of bones have been examined, and, in the majority of instances, the marrow presented a faintly yellow appearance, fairly vascular throughout, and of a fair consistence both on inspection and on handling. (There is no differentiation into red and yellow marrow.) In other instances the marrow was very pale, even lard-like in appearance and consistence; while yet again in others it presented a dull, sodden appearance quite unlike healthy marrow. As regards the epiphyses, too, bones have frequently been met with strikingly different from the normal, not only in the vascularity and general appearance of the epiphyseal line and the tissue in its immediate neighbourhood, but also in the epiphysis itself. It is hardly necessary to say that those bones must be selected in which both marrow and epiphyses are normal.

The mode of preparation is as follows: The marrow is extracted with ether, and the ethereal solution is evaporated at first in the open, and later over the warm water bath. The fat is then rubbed up with 1 per cent. chloretone for preservative purposes. It now appears as a whitish or faintly yellow fat with a strong odour, partly of ether, partly of chloretone. The melting point of the fat so obtained varies very widely. For example, one yield of fat would never become perfectly clear even when submitted for a long time to a very high temperature; another would only become clear at a melting point of 120° or 130°F., while yet another lot would rapidly clear at from 70°–90°F. The same supply of bones has sometimes yielded samples of fat with different melting points; in the first 130°F., in the second 110°F., and in the third 90°F. This order, again, has sometimes been reversed. The fat with the low melting point is the only one that has proved satisfactory in use; the others have been found to be unsuitable, and in some instances prejudicial.

The method of treatment consists in instilling into the ear half a drachm of a mixture of equal parts of rectified spirit and glycerin and in applying the same quantity to the skin round the ear,

followed by a similar application of myelocene, 10 drops being instilled at a time.

**Nux Vomica, Fluid Extract of, Removal of Oil from.** F. A. Sieker. (*Amer. Journ. Pharm.*, **74**, 175.) The author applies the method of removing fat from the extract of nux vomica by means of paraffin wax (*Year-Book*, **1901**, 194) to the fluid extract. It is, however, found necessary to distil off all the alcohol and redissolve the residue in water before treating with paraffin, since the removal of the fat is not satisfactory in alcoholic solutions.

One thousand parts of ground drug were practically exhausted by percolation with the U.S.P. menstruum for fluid extract of nux vomica, the alcohol was recovered by distillation and the residue diluted with water to 500 parts. Forty parts of paraffin were added and the mixture heated to 70 or 80°C. and briskly stirred for half an hour. It was then set aside for twenty-four hours in a place where it cooled slowly, so that the paraffin had a chance to rise to the top before congealing. The congealed paraffin and what it carried with it was separated and the aqueous liquid was then treated in the same manner with 30 parts of paraffin. The paraffin, etc. that was separated was warmed and stirred with 60 parts of water acidulated with acetic acid and then set aside to cool, when the liquid was separated and added to the more concentrated solution of extract. The mixed solutions were strained through a closely woven but comparatively thin muslin. The aqueous solution was carefully evaporated to about 400 parts and the percentage of extractive determined by drying 10 Gm. at 100°C. The amount of extractive was deducted from the total weight of the solution, which gave the amount of water present. For every 1,000 Gm. of water present in the solution 3,000 c.c. of alcohol was added. The percentage of total alkaloids was then determined and the preparation diluted with a mixture consisting of one volume of water and three volumes of alcohol until 100 c.c. represented 1.5 Gm. of total alkaloids.

**Nux Vomica, Tincture and Fluid Extract of, Preparation of** H. G. Greenish and F. A. Upsher Smith. (*Pharm. Journ.* [4], **12**, 667.) The tincture of nux vomica prepared as officially directed may be bright at summer temperatures, but deposit when cooled. This deposit is largely fatty matter, since nux vomica seeds contain from 2.6 to 4.7 per cent. of fat. The precipitation may be avoided by removing fat from the concentrated weak percolate obtained in the process of preparing the official fluid extract before mixing it with the reserve percolate. This is best

effected by evaporating the weak percolate to one-third of its volume, filtering through paper and continuing the evaporation to the volume given in the Pharmacopœia in the process for the preparation of the fluid extract. The use of kaolin does not effect the removal of fat better than paper alone; its use has the advantage that it hastens filtration. The loss of alkaloid resulting from filtration may be neglected. The resulting liquid extract, together with the tincture made from it, does not deposit fatty matter; a mixture prepared from the tincture is bright when made. The process of repercolation presents a product loaded with fat, which cannot be removed by filtration through kaolin; moreover, the process is a slow one. The official method is the best for preparing the liquid extract, provided that the fat be removed as suggested. No. 20 powder is more suitable for percolating nux vomica seeds than either a No. 40 or a No. 50 powder. The extract obtained from the modified liquid extract is easily reduced to powder.

It is suggested that the official directions should be modified so that the second weak percolate, after recovering the spirit is evaporated to one third, then, when cold, freed from fat by filtration. (See also *Year-Book*, 1901, 194.)

**Opium, Tincture of, Presence of Sulphates in.** F. H. Alcock (*Pharm. Journ.* [4], 12, 477.) Sulphates are found to be present, invariably, in tincture of opium in more than traces. Among six samples examined which gave from 0.035 Gm. to 0.088 Gm.  $\text{BaSO}_4$  from 10 c.c. of the original tincture, the specimen yielding the highest amount of sulphate was found not to have been assayed; the next highest in the series gave 0.043 Gm.  $\text{BaSO}_4$ . (See also *Year-Books*, 1879, 542, and 1883, 544.)

**Orange Flower Syrup.** W. Lyon. (*Pharm. Journ.* [4], 14, 174.) The preparation of this syrup by dissolving the sugar in water and the prescribed quantity of orange flower water, in the cold, in a stoppered bottle is recommended, if necessary, standing the bottle in a moderately warm place.

**Orange Flower Syrup.** A. C. Abraham. (*Pharm. Journ.* [4], 14, 255.) This syrup may be expeditiously prepared by rubbing down sugar, 16 oz., with orange flower water, 8 fl. oz., and adding 3 lbs. of simple syrup.

**Phosphorous, Action of, on Organic Substances in Pills.** W. Harrison Martindale. (*Brit. Med. Journ.* [1], 1902, 578.) From the examination of pills containing phosphorus, with strychnine, morphine, and quinine sulphate, respectively, coated

with sandarac varnish and kept for varying periods, leads to the conclusion that no decomposition of the alkaloids occurs; with nitro-glycerin also no decomposition was found to occur. In the case of zinc valerianate, although that salt could not be recovered, as such, from pills containing it and phosphorus, it is considered that the combination observed took place, not in the pills themselves, but during the process of extraction. In all cases the phosphorus was found to be luminous in the dark, showing that no great oxidation had occurred. The pills of phosphorus and nitro-glycerin were, in this respect, the best.

**Physol.** M. J. Wilbert. (*Amer. Journ. Pharm.*, **73**, 537.)

Under this name a formula is given for a solution of pepsin, combined with antiseptic essential oils, for use as a physiological solvent for external application to indolent ulcers, abscesses and necrotic areas. Pepsin (U.S.P.), 50 Gm., is dissolved in distilled water, 800 c.c., and the solution mixed with diluted hydrochloric acid, 20 Gm., and glycerin, 50 Gm. Menthol, eucalyptol, and oil of wintergreen, each 0.5 Gm., are then dissolved in alcohol 95 per cent., 10 Gm., and the second solution is added to the first. Finally, sufficient distilled water is added to make up to 1,000 c.c.; the mixture, shaken thoroughly with purified talcum, 50 Gm., is then filtered through paper until bright. The resulting clear, light yellow, aromatic solution is said to keep well.

**Protargol, Pharmaceutical Manipulation of.** F. Goldmann. (*Journ. Pharm. Chim.* [6], **14**, 86, after *Berichte Pharm.*) Heat should never be employed in making protargol solutions. When strong solutions are thus prepared, a considerable decomposition and even a precipitate may be formed; the 0.5 to 1 per cent. solutions usually prescribed, when prepared with heat have a darker colour than those prepared in the cold, and give rise to smarting when brought into contact with the mucous membrane, which the cold-prepared solutions do not produce. The protargol should be rubbed down first to a thin paste with a portion of cold water and then the rest added. Glycerin is useless for the purpose. Solution may also be obtained by sprinkling the protargol a little at a time on the surface of the water in a dish. For 1 or 2 per cent. solutions 10 to 15 minutes are required to dissolve the protargol. Strong stock solution of protargol for dilution to prescribed strengths should not be made, since the preparations thus obtained differ markedly in action from those freshly made by direct solution.

**Resin Ointment.** W. Lyon. (*Pharm. Journ.* [4], **14**, 174.) The official directions for the preparation of this ointment are criticized and the following *modus operandi* suggested for adoption. Reduce the resin to fine powder in a mortar, add the olive oil, and triturate until the resin is thoroughly distributed, taking care that none remains adhering to the sides, this precaution being essential to rapid solution. Now put in the lard, mix thoroughly, and finally add the wax (in fine shreds). Triturate again, and then place mortar in a suitable water bath. Constant stirring accelerates solution, but is not absolutely necessary. The ointment should be continuously stirred whilst cooling.

**Rubber Plaster, Adhesive.** (*Annales de Pharm.*, **8**, 8.) Gutta percha, in thin sheets, 2; yellow resin, 3; dammar, 2; linseed oil, 3; carbolic acid, 0.3; dried starch, 6. Melt the resins in a capacious dish, over the naked flame, with the oil. Strain while hot, add the gutta percha, mix; then incorporate the starch previously dried at 120°C., finally add the phenol to the nearly cold mass. Spread on linen, and cover the face of the plaster with muslin before rolling up. By substituting copal for dammar, a product resembling American rubber plaster is obtained.

**Serums, Artificial.** (*Journ. Pharm. Chim.* [6], **14**, 143.) *Physiological Salt Solution.* Pure sodium chloride, 7.5; sterilized distilled water, 1000. Dose, for infants: 5 to 30 Gm. for one injection, or 10 to 90 Gm. in 24 hours; for adults: 10 to 1000 Gm. for one injection; 1000 to 3000 Gm. in 24 hours.

*Hayem's Serum.*—Sodium sulphate, 10; sodium chloride, 5; sterilized distilled water, 1000. Dose: similar to physiological salt solution.

*Chéron's Serum.*—Pure sodium sulphate, 8; sodium phosphate, 4; sodium chloride, 2; pure phenol, 1; sterilized distilled water, 100. Dose: 5 to 10 c.c. per diem.

*De Renzi's Iodized Serum.*—Iodine, 1; potassium iodide, 3; sodium chloride, 6; sterilized distilled water, 1000. Dose in surgical tuberculosis: 200 to 300 c.c. per diem.

**Sitogen.** A. Beythien. (*Chem. Centr.*, **72**, 50.) This is probably an inspissated yeast extract seasoned with salt, which has been introduced as a substitute for meat extract. Analysis bears out the claim that it is entirely a vegetable product. It contains 8.63 per cent. of albumoses, 32.19 per cent. of peptones and plant bases, a total nitrogen yield of 7.01 per cent.; phosphoric anhydride, 5.19 per cent.; chlorine, 7.10 per cent.; water, 29.02 per cent. Although the preparation is elegant and palatable, and

is cheap, the author does not consider it proved that the dietetic value of sitogen is equivalent to that of meat extract, merely on the grounds of the presence of certain nitrogenous constituents in similar proportions.

**Solubilities of Chemical Substances mentioned in the B.P., 1898.**  
H. G. Greenish and F. A. Upsher Smith. (*Pharm. Journ.* [4], **14**, 510, 532, 551.) The summary of the results of a long and very complete series of experiments is thus given by the authors at the conclusion of the papers—

| Name of Salt         | Temp<br>Fahr<br>Deg | Solubility found                                                                                         | British<br>Pharma-<br>copœia. | German<br>Pharma-<br>copœia | United<br>States<br>Pharma-<br>copœia. |
|----------------------|---------------------|----------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------|----------------------------------------|
| Acidum Arseniosum    | 61                  | { Crystalline 1 in 71 }<br>{ Amorphous 1 in 63 }                                                         | 1 in 100                      | —                           | 1 in 80<br>1 in 30                     |
| Acidum Boricum       | 60                  | 1 in 25                                                                                                  | 1 in 30                       | 1 in 25                     | 1 in 25 6                              |
| Acidum Chromicum     | 61 5                | 1 in 0 59                                                                                                | Very<br>soluble               | —                           | Very<br>soluble                        |
| Acidum Citricum      | —                   | 1 in 0 51                                                                                                | 1 in 0 75                     | 1 in 0 54                   | 1 in 0 68                              |
| Acidum Tartaricum    | 61<br>60            | 1 in 0 71                                                                                                | Readily<br>in less<br>than 1  | 1 in 0 8                    | 1 in 0 8                               |
| Alum (Ammonium)      | 59 5                | 1 in 9 95                                                                                                | { 1 in 10                     | 1 in 10 5                   | 1 in 9                                 |
| Alum (Potassium)     | 59 5                | 1 in 9 70                                                                                                | (Potass<br>alum)              | (Potass<br>alum)            | (Potass<br>alum)                       |
| Calcii Chloridum     | 60                  | { CaCl <sub>2</sub> 1 in 1 41 }<br>{ CaCl <sub>2</sub> .2H <sub>2</sub> O 1 in 0 52 }                    | 1 in 1                        | —                           | 1 in 1 5                               |
| Cupri Sulphas        | 61                  | 1 in 2 79                                                                                                | 1 in 3 5                      | 1 in 3 5                    | 1 in 2 6                               |
| Lithii Citras        | 59                  | 1 in 1 63 5                                                                                              | 1 in 2                        | —                           | 1 in 2                                 |
| Magnesi Sulphas      | 60                  | 1 in 0 98                                                                                                | 1 in 1                        | 1 in 1                      | 1 in 1 5                               |
| Zinci Acetas         | 60                  | { ZnAc <sub>2</sub> .2H <sub>2</sub> O 1 in 2 40 }<br>{ ZnAc <sub>2</sub> .3H <sub>2</sub> O 1 in 2 11 } | 1 in 2 5                      | 1 in 3                      | 1 in 2 7                               |
| Zinci Chloridum      | 60                  | 1 in 0 344                                                                                               | Almost<br>entirely<br>soluble | Easily                      | 1 in 0 3                               |
| Zinci Sulphas        | 59 5                | 1 in 0 65                                                                                                | 1 in less<br>than 1           | 1 in 0 6                    | 1 in 0 6                               |
| Zinci Sulphocarbolas | 60                  | 1 in 2 70                                                                                                | 1 in 2 0                      | —                           | —                                      |

**Spoonful Doses.** C. B. Lowe. (*Amer. Journ. Pharm.*, **73**, 593.) Attention is directed to the inaccuracy of the popular spoonful dose. In actual practice, few persons fill spoons perfectly full with medicinal liquids, but only approximately so; and yet by the use of the average teaspoon, the patient would get about 50 per cent. more than the theoretical quantity. The average dessert and tablespoon would give about 25 per cent. more. As the teaspoon is the measure by which liquid medicines are ordinarily administered, this average increase in size of 50 per



cent. becomes a matter of some consequence, especially when maximum doses of active drugs are prescribed. For instance, a physician might think he was giving the  $\frac{1}{16}$  of a grain of strychnine, whereas by the ordinary teaspoon the patient would get  $\frac{3}{32}$  of a grain, or nearly  $\frac{1}{16}$ . Or 4 m. of hydrocyanic acid might be prescribed as a dose, but the patient would get 6 m. When potent drugs in maximum doses are prescribed, the importance of the use of an accurate glass graduate, instead of the unreliable spoon, is insisted on.

**Squill, Syrup of.** A. C. Abraham. (*Pharm. Journ.* [4], 14, 255.) The preparation of syrup of squill by the cold process, as suggested by Merson (*Year-Book*, 1901, 207) is not recommended on the grounds that it would probably differ in potency from the syrup prepared by heat, on which the therapeutic results have been based. It would seem that both the heat-prepared syrup and the oxymel are preferred by prescribers, since they are much more employed than the tincture which is prepared in the cold. It may be that the decomposition products of the glucosides of squill are what are really required by the physician.

**Steral Paste.** Schleich. (*Pharm. Post*, 38, 75). Stearin, 100, is melted on the water bath, and to it is added, drop by drop, solution of ammonia 10 per cent., 10; the mixture is then removed from the water bath, and water 100, made slightly alkaline with  $\text{Na}_2\text{CO}_3$ , added, drop by drop, the stirring being continued until the mixture thickens; a little more ammonia is then added until a product soluble in water is obtained. This is then treated with water 50, and should yield a snow-white emulsion.

**Sulphur, Ointment of, with Vaseline Oil.** Daggett and Ramsdell (*Pharm. Centralh.*, 42, 717) recommend the following formula for all cases which require a sulphur ointment. It is exceptionally useful for application to the scalp: Precipitated sulphur, 15; white wax, 15; vaseline oil, 120; rose water, 30; borax, 2.

**Suppositories.** L. F. Stevens. (*Amer. Drugg.*, 40, 189.) The author advocates the massing of suppositories in a mortar with a flexible spatula, the basis, cacao butter, being first shredded very fine. When working at a temperature of 62–70°F. the addition of 10 minims of castor oil to each 100 grains of mass will make the consistence more plastic. With a higher temperature, less oil is needed, until, at 85–90°F., none is requisite. Potent ingredients, such as alkaloids, should first be triturated with some inert powder, such as lycopodium, milk sugar, or starch,

before massing. The homogeneous mass may then be divided and finished off by hand or by a compressing machine. As an alternative method the usual mode of melting and moulding may be employed. With some drugs, such as creosote, phenol, guaiacol, and ichthyol, the use of heat should be avoided. Ichthyol may be massed in the cold with 25 per cent. of cacao butter. Phenol may be dispensed in an elegant suppository by using lycopodium to absorb the liquid in the proportion of 10 grains to each 6 minims of acid, massing with 50 grains of cacao butter. Creosote is best first massed with sodium benzoate, thus: Creosote, 5 minims; sodium benzoate, 15 grains; cacao butter, 20 grains; triturate thoroughly, and compress or mould by hand or machine. Chloral hydrate is best compounded in suppository form by first triturating with equal parts of milk sugar, then massing with a melted mixture of white wax, 20, and cacao butter, 80.

**Suppositories, Cold Preparation of.** Meistermann. (*Répertoire*, 58, 202.) The use of a basis of powdered acacia, grated cacao butter, and water is advocated, which is massed in a mortar, rolled out and divided like a pill mass. For example with the following prescription: Cacao butter, 9 Gm.; extract of krameria, 3 Gm.; extract of belladonna, 30 Cgm.; extract of opium, 30 Cgm.; to make 3 suppositories. The extracts are dried and rubbed down with 2.25 Gm. of powdered gum acacia, 6.75 Gm. of grated cacao butter is then added, and a little water, the mass being formed as if for pills. When mercurous iodide or similar bodies which cannot be heated are prescribed, this *modus operandi* will be found very serviceable.

**Suppositories, A New Basis for.** E. Crouzel. (*Répertoire de Pharm.* [3], 14, 7.) Since anhydrous lanolin will absorb its own weight of water, or of saturated aqueous solutions of salts, or of vegetable extracts, a basis consisting of hard paraffin, 1; anhydrous lanolin, 3, is recommended for the preparation of suppositories and pessaries. This basis is specially useful for those drugs, such as vegetable extracts which are difficult to incorporate with cacao butter.

**Tar Ointment.** W. Lyon. (*Pharm. Journ.* [4], 12, 62.) The official formula is condemned, and the following ointment with a soap basis suggested as an alternative, the consistence of the basis being altered for the winter and summer seasons. For summer: soft soap, B.P., 1; hard soap, B.P., 2; tar, 3. For winter: soft soap, B.P., 1; hard soap, B.P., 1; tar, 2 parts, are recommended. It is important that the hard soap employed should not

be dry and brittle, otherwise a smooth ointment will not be obtained. The hard soap is cut into shreds, mixed with the other ingredients in a mortar, which is placed in a water bath, and the mixture is stirred frequently until solution is effected. Superfatted soap and tar in equal proportions give an ointment which is somewhat soft but well adapted for application to the skin.

**Tartarated Iron.** W. Lyon. (*Pharm. Journ.* [4], **14**, 530.) It is found that the substitution of sodium-potassium tartrate for potassium acid-tartrate produces a scale compound which is not only soluble when first prepared, but which maintains its solubility for a couple of months, which the product of the official formula does not. A tartarated iron yielding 28 per cent. of  $\text{Fe}_2\text{O}_3$  on incineration may be obtained by employing the following ingredients:—Solution of ferric sulphate, 300 c.c.; solution of ammonia, 480 c.c. or q.s.; sodium-potassium tartrate, 175 Gm.

It is readily soluble in water when freshly prepared, and remains so for a couple of months, but beyond that period a pronouncement cannot be given at present. Even supposing, however, that in this respect it is not superior to the official preparation, there is another point of difference which is worthy of some consideration. It is a well-known fact that preparations of iron have an enhanced remedial effect when given in combination with a laxative, though, strange to say, such a combination has not a place in the Pharmacopœia. Now, a tartarated iron prepared as above would have a slight laxative effect in full doses, and for this reason is to be preferred to the official preparation. Compounds containing a larger proportion of sodium potassium tartrate can be scaled, but the deliquescence increases with the addition of tartrate, and on this account, they are not to be recommended in scale form. For example, the following formula:—Solution of ferric sulphate, 100 c.c.; solution of ammonia, 160 c.c. or q.s.; sodium potassium tartrate, 220.1 Gm., when scaled, yields 10.84 per cent. of ferric oxide, but instead of scaling it is much preferable to stop the evaporation of the solution when it weighs 379.4 Gm. and then add 184.7 Gm. of glycerin. The product should yield about 3.7 per cent. of ferric oxide. Thus prepared, it keeps well, and if adopted would prove a useful addition to the official list of iron preparations.

Though used to a considerable extent on the Continent, tartarated iron in scale form has never been much in favour with the medical practitioners of this country, and it is questionable if in its present form it is entitled to a place in the next Pharmacopœia.

**Thyroid Pills.** P. Antoine. (*L'Union Pharm.*, **42**, 245.) Healthy glands are mixed and pulped; the paste thus obtained is spread out in a thin layer and dried under a bell-jar over  $\text{H}_2\text{SO}_4$ . Desiccation is complete in 8 to 10 hours, the loss being equivalent to about 75 per cent. Five Gms. of this dried gland, equivalent to 20 Gm. of fresh gland, is mixed with sugar, 3 Gm., powdered, and massed with powdered gum tragacanth, 2 Gm., powdered wood charcoal, 4 Gm., simple syrup, q. s., and divided into 100 pills. These are then dried in a desiccator over  $\text{H}_2\text{SO}_4$ . When dry, they may be coated with tolu, benzoin, mastic, or gluten, and preserved in dry well-corked bottles. Each pill contains practically its own weight of fresh thyroid gland.

**Valerian, Ammoniated Tincture of.** W. Lyon. (*Pharm. Journ.* [4], **12**, 600.) Moistening the powdered root with the prescribed amount of solution of ammonia, packing in a percolator, allowing to stand for 24 hours and then percolating, is recommended as a preferable method to the simple maceration at present ordered in the Pharmacopœia.

**Vermifuge Pills.** (*Journ. Pharm. d'Anvers*, **58**, 104, after *Pharm. Zeit.*) The following is said to give a harmless and effective tœnicide pill, for adults:—Black cupric oxide, 92 grains; precipitated chalk, 30 grains; white bole, 185 grains; glycerin, q. s. to mass. Divide into 120 pills. Two pills to be taken 4 times daily, avoiding meanwhile all acid in food and drink. After the last day the patient should take a dose of castor oil.

**Virginian Prune, Syrup of.** F. W. Flett. (*Canadian Pharm. Journ.*, **35**, 264.) The official formula gives a product which does not keep well, due, according to the author, to the presence of ferments. The following method of procedure, on the other hand, affords an elegant syrup which is perfectly stable:—Macerate wild cherry bark (ground for percolation), 3 ozs., in a menstruum composed of glycerin,  $1\frac{1}{4}$  part, and distilled water,  $7\frac{3}{4}$  parts, and percolate until the desired quantity is obtained. The sugar is dissolved in the liquid by percolation, adding distilled water to the percolator until twenty fluid ounces are obtained.

**Zinc Oleate Ointment.** W. Lyon. (*Pharm. Journ.* [4], **14**, 175.) The removal of the water from the precipitated zinc oleate by pressure between calico is recommended as giving a product which forms a whiter ointment than the oleate dried on the water bath, as directed in the official directions.

## NOTES AND FORMULÆ.



## PART IV.

### NOTES AND FORMULÆ.

**Acne, Juvenile, Ointment and Lotion for.** Brocq. (*Journ Pharm. Chim.* [6], **14**, 192.) Camphorated  $\beta$ -naphthol, 5 grs.; resorcin, 3 grs.; soft-soap, 3 grs.; prepared chalk, 8 grs.; precipitated sulphur, 24 grs.; vaseline, 310 grs. Apply to the spots every night, increasing or lessening the amount of vaseline according to the effect produced. Every morning apply the following lotion: Borax, 1; camphorated ether, 4; rose water, 10; distilled water, 15.

**Alcoholic Pumice Stone Soap.** Pfoerringer. (*L'Union Pharm.*, **43**, 70.) Neutral white castile soap, finely shaved, 60 to 80, is dissolved in strong alcohol 300 fluid parts, on the water bath. When dissolved, a further 700 fluid parts of alcohol is added, and powdered sterilized pumice powder, 300, is gradually stirred into the solution, agitation being continued as the liquid cools. When it assumes a creamy consistence it is poured into suitable vessels and preserved from contact with the air. This soap is specially useful for disinfecting the hands, being rubbed over the skin with a piece of sterilized flannel. The hands are then rinsed in sterilized water, or in a 1:1000 sublimate solution. This method of sterilizing the hands has the advantage of neither irritating nor hardening the skin, while complete sterilization is effected by its employment.

**Antiseptic and Absorbent Powder, Championnière's.** (*Journ. Pharm. Chim.* [6], **14**, 95.) Iodoform, cinchona bark, benzoin, magnesium carbonate, equal parts, are mixed, the magnesium carbonate being first saturated with eucalyptus oil. The powder is made up into small packets with pieces of gauze which has been boiled in a 1:40 solution of phenol.

**Astringent Wash.** (*Pharm. Journ.* [4], **14**, 486, after *Bull. of Pharm.*.) Cucumber juice,  $1\frac{1}{2}$  oz.; tincture of benzoin,  $\frac{1}{2}$  oz.; eau de Cologne, 1 oz.; elder-flower water, 5 ozs. Put the tincture of

benzoin in an eight-ounce bottle, add the other ingredients, previously mixed, and shake slightly. There will be some precipitation of benzoin in this mixture, but it will settle out, or it may be strained out through cheese-cloth. This article is used to correct coarse pores, and to remedy an oily or flabby skin. Apply with a sponge night and morning.

**Baking Powder.** (*Pharm. Journ.* [4], **14**, 169.) Tartaric acid, 12 ozs.; sodium bicarbonate, 1 lb.; rice flour,  $4\frac{1}{4}$  lbs. Dry the acid and sodium bicarbonate thoroughly, then powder and mix separately with half of the rice flour in each case. Finally mix together, and pass through a sieve.

**Bay Rums.** (*Pharm. Zeit.*, **46**, 286.) (1) Oil of myrcia acris, 16 parts by weight; sweet orange oil, 1; pimento oil, 1; rum, 10,000; water, 1,000; borax, 5,000. Alcohol 90 per cent. may be substituted for the rum. Allow to stand for several days and filter; or add another 18,000 of water and distil off the first 20,000 parts. (2) Oil of myrcia acris, 16; rum, 10,000; water, 1,000; borax, 5. (3) Oil of myrcia acris, 15; sweet orange oil, 1; pimento oil, 1; spirit, 1,000; water, 750; spirit of soap or of quillaia bark, q.s. (4) Oil of myrcia acris, 12.5; sweet orange oil, 1; pimento oil, 0.5; spirit, 200; water, 2,800; Jamaica rum essence, 75; powdered soap, 20; quillaia extract, 5; borax, 10. Colour with caramel. (5) Oil of myrcia acris, 16; clove oil, 1; pimento oil, 1; Jamaica rum essence, 75; spirit, 2,650; water, 1,850. Mix and filter. (6) Tincture of myrcia acris (1:10), 600; spirit 96 per cent., 500; bay oil, 10; pimento oil, 1; sweet orange oil, 1, are mixed, and, after three days, distilled water, 800, is added. Allow to stand for eight days and filter. The tincture of myrcia acris is prepared from the leaves with a strong alcohol. (7) Spirit 95 per cent., 1,000, is mixed with oil of myrcia acris, 14, and allowed to stand fourteen days, when Jamaica rum, 2,000, is added. (8) Alcohol, 200 Gm.; oil of myrcia acris, 1 Gm.; pimento oil, 10 drops; clove oil, 1 drop, are mixed and added to water, 200 Gm. (9) Bay oil, 3.75; pimento oil, 3.75; acetic ether, 7.5; alcohol, 13,500; distilled water, 11,750. Colour with spirit colouring. (10) Spirit 95 per cent., 1,100; warm water, 4; white soft soap, 30, dissolved in warm water, 460; Jamaica rum essence, 60; oil of myrcia acris, 6; clove oil, 4; absolute alcohol, 30; cinnamon oil, 1. (11) Oil of myrcia acris, 70; cachaca essence, 200, are dissolved in spirit 95 per cent., 10,000; then rosewater, triple, 3,000, is added, the mixture shaken, and finally water, 5,000, is added. (12) Bay rum shampoo may be made as follows: Am-



monium carbonate, 3; potassium carbonate, 5; yellow soap, 25; dissolved in distilled water, 75; and added to bay rum, 500; eau de Cologne, 75.

**Beef, Iron and Wine** H. P. Hynson. (*Amer. Drugg.*, **39**, 201.) Extract of beef, 280 parts; tr. ferri citro-chlor., 280 fluid parts; hot water, 480; alcohol, 1,000; syrup, 1,000; comp. spirit orange, 8; port wine, detannated, enough to make 8,000. Rub down the beef extract with the hot water; add the alcohol and allow to stand three or four days; then recover the alcohol by distillation. Add to the residue 6,000 fluid parts of the wine, to which the compound spirit of orange has previously been added. Finally, add the tincture of iron citro-chloride, the syrup, and enough wine to make 8,000 fluid parts.

(N.B.—This preparation cannot be retailed in Great Britain without a wine licence.)

**Benzine Cream Cleanser.** (*Amer. Drugg.*, **39**, 209.) Benzine may be converted into a cream or jelly by the addition of a solution of soap, with added alkalis, or by means of tincture of soap bark: Cocoonut oil soap, 2 ozs.; ammonia water, 3 fl. ozs.; solution of potash, 1½ fl. oz.; water, enough to make 12 fl. ozs. Dissolve the soap with the aid of heat in 4 fl. ozs. of water, add the ammonia and potash and the remainder of the water. If the benzine is added in small portions, and thoroughly agitated, 2½ fl. ozs. of the above will be found sufficient to solidify 32 fl. ozs. of benzine.

The jelly made from soap bark is much easier of manipulation, being made as follows: Tincture of quillaia, 3 fl. ozs.; benzine, enough to make 16 fl. ozs. The mixture must be shaken continuously during half an hour, then set aside to solidify, which happens in about twelve hours.

**Beverages for Invalids.** (*Deutsch. Amer. Apoth. Zeit.*, **22**, 143.) *Strawberry Lemonade.* Citric acid, 6; distilled water, 600; white sugar, 450; syrup of strawberries, 600; syrup of cherries, 300; red wine, 450; aromatic tincture, 1.

*Lemonade Powder.* Sodium bicarbonate, 65; acid, tartaric, 60; white sugar, in powder, 125; lemon oil, 0.75.

*Lemon Squash.* Syrup, 200; tartaric acid, 15; distilled water, 100; lemon oil, 0.2; tincture of vanilla, 0.4.

*Lemonade Pastilles.* Tartaric acid, 155 grains; powdered white sugar, 465 grains; powdered gum acacia, 31 grains; starch, 8 grains; lemon oil, 6 drops; dilute alcohol, q.s. Divide into 30 pastilles.

**Brilliantines.** F. Naffin. (*Pharm. Post.*, **34**, 475, after *Augsb. Seifsid. Zeit.*) *Lily of the Valley Lustraline.* Castor oil, 1,500; alcohol (90 per cent.), 1,500; ylang-ylang oil, 5; lignaloe oil, 20; terpeneol, 10; simple tincture of benzoin, 50. Colour with chlorophyll.

*Violet Brilliantine.* Castor oil, 1,500; alcohol 90 per cent., 1,500; tincture of orris, 10; solution of ionone (10 per cent.), 2; oil of bergamot, 5; tincture of musk, 5. Colour with chlorophyll.

*Rose Brilliantine.* Castor oil, 1,500; alcohol 90 per cent., 1,500; otto, 3; African geranium oil, 12; oil of petit grain, 15. Colour with tincture of saffron.

**Camphor Ointment, Compound.** (*Amer. Drugg.*, **39**, 377.) Camphor, 1 oz.; carbolic acid, 1 oz.; acid, salicylic, 2 ozs.; ichthyol, 2 ozs.; white wax, 2 ozs.; sulphur, 10 ozs.; zinc oxide, 10 ozs.; pine tar, 10 ozs.; petrolatum, 20 ozs. M Put up in 2 oz. tin boxes.

**Carbolic Salve.** (*Pharm. Journ.* [4], **14**, 486, after *Bull. of Pharm.*) Petrolatum, 16 ozs.; paraffin, 1½ oz.; camphor, 1 oz.; carbolic acid, 210 grs.; oil of sassafras, 30 m. Rub the carbolic acid, camphor, and oil together until solution is effected. Add to the petroleum and paraffin previously melted, and stir until cool.

**Chaps, Frost Bites and Chilblains, Remedies For.** (*Nat. Drugg.*, **31**, 306.) *Frost Bite.* Dr. Kepes, Surgeon to the Austrian North Polar Expedition, declares that he obtained the greatest relief and most excellent results, generally, from the following: Iodine, 4 parts; ether, 30; flexible collodion, 100. Dissolve the iodine in the ether and mix the solution with the collodion.

Nordenskiöld relied altogether upon the following: Corrosive sublimate, 1 part; castor oil, 3; oil of turpentine, 4; collodion, 42. Mix.

A "Hudson Bay Trapper" recommends in *The English Mechanic*, a liniment as follows: Oil of turpentine, 1 oz.; yolk of 1 egg; linseed oil, q.s. to make 8 ozs. Mix thoroughly by agitation.

Finally the following ointment is prescribed by the Russian army surgeons throughout Russia: Ox marrow, 28 parts; hydrochloric acid, 21; aqueous extract of opium, 2; camphor, 7; Venice turpentine, 14; althæa ointment, 84. Mix, and make an ointment.

*Chilblains.* The following are for unbroken chilblains:

1. Sulphurous acid, 3 parts; glycerin, 1; water, 1. Mix.
2. Balsam of Peru, 1 part; alcohol, 24; hydrochloric acid, 1;

compound tincture of benzoin, 8. Dissolve the balsam in the alcohol, and add the acid and tincture. Apply morning and evening.

3. Lard, 128 parts; turpentine, 32; camphor, 8; oil of rosemary, 1. Mix. Apply morning and night.

4. Nitrate of mercury ointment, 8 parts; camphor, 1; oil of turpentine, 2; olive oil, 4. Mix. Apply with gentle friction morning and night.

5. Goulard's extract, 1 part; camphorated oil, 2; simple cerate, 6. Melt the cerate and add the other ingredients.

6. Sulphuric acid, 1 part; turpentine oil, 1; olive oil, 6.

Mix the oils and add the acid, drop by drop, with constant stirring. Label: For the Itching of Unbroken Chilblains. Rub in gently two or three times a day.

*Chilblains in any Stage.*—A few years ago Vigier stated in the *Gazette hebdomédaire de Médecine et de Chirurgie* that he "would guarantee the most happy results" from the use of the first of following on chilblains:—

1. Tannin, 1 part; glycerin, 20; rose water, 128. Mix, and filter. Directions: Rub the affected parts with a few drops every morning and evening.

2. Salol, 6 parts; olive oil, 6; lanoline, 100. Mix, and make an ointment. Apply morning and night.

3. Castile soap, 2 parts; best mutton suet, 2; tincture of camphor, 1; malt vinegar, 1. Melt the suet and soap together and stir in the vinegar. Remove from fire and stir until the mass has cooled to about 150–160°F., then add the camphor, a little at a time, under constant stirring. Stir until cold.

4. Menthol, 3 parts; salol, 4; lanoline, 150; olive oil, q.s. Melt the lanoline and add a sufficient quantity of olive or almond oil to give it the proper consistence for use (more of the oil in winter and less in summer). While it is still warm incorporate the menthol and salol. Directions: apply with gentle friction two or three times a day.

5. Camphor, 5 parts; carbolic acid, 5; wax, 15; vaseline, 30; olive or almond oil, 20. Melt the wax and vaseline together. Dissolve the camphor and carbolic acid in the oil by the aid of heat, and add to the mixture first made. Or, the camphor and carbolic acid may be liquefied by mixing and added to the mixture of wax, vaseline and oil. This is an admirable remedy, as it stills and quiets the itching rapidly.

6. Resorcin, 2 parts; ichthyol, 2; tannin, 2; water, 10. Mix,

and attach a "shake" label. Directions: On going to bed wash the feet or affected part with *tepid* (not hot) water and dry carefully with an old, soft towel. When dry, paint over the affected part with the foregoing mixture, using a camel's hair pencil, and let it dry on. The application, in the course of a few minutes, dries into protecting varnish. Under this treatment, which may be repeated every night or every other night, *pro re nata*, tumefaction quickly subsides, itching and burning pass off, and resolution quickly follows.

The only objection that can be urged against this treatment is that it blackens the part to which it is applied more or less permanently, until the epidermis scales off, and with very delicate skins it sometimes causes cracking or fissuring. For this reason we would recommend, in such cases, the following, which, while not so efficient, is free from the defects mentioned:—

7. Resorcin, 8 parts; talc, 8; water, 16. Mix. Affix "shake" label. Use in the manner recommended in the foregoing.

*Chaps*.—The following will prevent chapping of the skin if used regularly and constantly during exposure to the cold or raw weather:—

1. Best old white castile soap, 64 parts; spermaceti, 16; olive oil, 4; camphor, 1; alcohol, 2; distilled water, 64; essential oil, q.s. to perfume. Melt the soap, rasped or shaved thinly, and the spermaceti together; dissolve the camphor in the oil, by the aid of heat and add to the mixture. Add the water, little by little, under constant stirring. Remove from the fire, let cool down to about 140° or 150°F., stirring all the time, and add the essential oil dissolved in the alcohol. Stir till cool.

Vigier also recommends the tannin and glycerin mixture prescribed by him for chilblains, also as a preventive of and cure for chaps, chafes, etc. Says he (*loc. cit.*): "It softens the skin, makes it supple, dissipates pimples; it opposes and overcomes the minor impressions of cold, the wind and the sun (i.e. roughness and cracking of the skin, sunburn, etc.), and finally cures or causes to disappear chaps on the skin or lips."

Some forty years ago a woman made a great deal of money in Paris by selling a "complexion balm," guaranteed to cure almost all ailments of the skin at the moderate sum of one Napoleon, the bottle, containing about 4 ozs. It was really an excellent preparation for roughened and chapped skins. On chemical examination it proved to be nothing more than glycerin and white of egg,

in nearly equal parts, with a little perfume. The mixture, slightly altered, was subsequently put on the market under the name of "Glycerin Sichel." This mixture of albumin and glycerin alone, or glycerin carrying a small percentage of borax, is really an admirable dressing for the skin. Glycerin alone should never be used on the skin, as its avidity for water causes it to withdraw it from the epidermis, dry the latter and turn it yellow. Mixed with water, rose water, or albumin, it is a most grateful application to the inflamed skin.

2. Zinc oxide, 4 parts; tannic acid, 3; spirit of camphor, 6; tincture of benzoin, 6; glycerin, 250; water, q.s. to make, 300. Mix. Directions: Wash the part affected in lukewarm water in cold weather, or cold water in summer. Dry carefully with a soft napkin, apply the mixture with a soft sponge and let dry on.

**Chilblains, Hydrogen Peroxide for.** Courtin. (*Répertoire*, 14, 120.) A daily bath of peroxide of hydrogen, applied for half an hour, will generally cure unbroken chilblains in three applications. For very young children the peroxide should be diluted with 3 parts of recently-boiled distilled water. Broken chilblains take longer to heal, according to the degree of ulceration. For these the addition of a solution of borax, to neutralize the acidity of the peroxide, should be employed.

**Chilblain Ointments.** (*Pharm. Zeit.*, 47, 83.) (1) Epicarin, 6; green soft soap, 1; casein ointment, 60. (2) Camphor, 10; Peruvian balsam, 5; vaseline, q.s. to make 100. (3) Phenol, lead ointment, lanoline, of each, 20; oil of sweet almonds, 10; oil of lavender, 1. (4) Dilute hydrochloric acid, 12; extract of opium, 1; camphor, 4; Venetian turpentine, 8; bone marrow, 16; marsh mallow ointment to make 100.

**Coffee Essence.** (*Nat. Drugg.*, 32, 67.) The following is taken from "*La Nature*": Take freshly-roasted coffee, ground moderately fine, 600, and saturate the powder with any desired quantity of a mixture of alcohol (90 per cent.), 120, and distilled water 360, and pack in a percolator. Close the faucet and let stand, closely covered for 24 hours, then pour on the residue of the alcohol and water, and add sufficient water so that the percolate measures 480 fluid parts. Set the percolate aside and continue the extractions with hot water until the powder is exhausted. Evaporate the resultant percolate down to the consistence of an extract and add it to the first percolate. Dissolve by agitation and, if necessary, filter.

**Cold Cream.** (*Pharm. Journ.* [4], **14**, 485, after *Bull. of Pharm.*) White wax,  $\frac{1}{4}$  oz.; spermaceti,  $2\frac{1}{2}$  ozs.; oil of sweet almonds,  $2\frac{1}{2}$  ozs. Melt, remove from the fire, and add rose water,  $1\frac{1}{2}$  oz. Beat until creamy, not until cold. When the cream begins to thicken add a few drops of oil of rose. Only the finest almond oil should be used, and one should be careful in weighing the wax and spermaceti. These precautions will insure an elegant product.

**Colouring Metals.** (*Nat. Drugg.*, **32**, 40, after *Rev. de Physique et de Chimie.*) **COPPER. Black.** To colour copper black immerse the object, previously well cleaned, in the following, and let remain for from 30 to 45 minutes, and afterwards wash well: (1) Antimony chloride, 15 parts; alcohol, 125 parts; hydrochloric acid, sufficient to dissolve. Mix. The less of the acid that is used, the better the result. This process deposits a coating of antimony. (2) Plunge the object into nitric acid, remove, and heat to a dull red. Deposits a coating of copper oxide. (3) Plunge the copper, previously well cleaned, into the following: Arsenious acid, 2 parts; hydrochloric acid, 4; sulphuric acid, 1; water, 24. Mix. Causes a deposit of arsenic.

**Bluish Grey.** Suspend the object in the following at an almost boiling heat: Sodium sulphide, 1 part; antimony sulphide, 1; water, 12. Mix. Let remain until the desired tint is obtained, wash rapidly with water, and dry.

**Brown.** Immerse in nitric acid sufficiently long to give a bright surface, rinse in clear water and plunge into a solution of iron chloride.

**Olive Green.** Cover with a solution of iron and arsenic in hydrochloric acid. Polish with lead minium, warm and colour with the following varnish: Gamboge, 1 part; yellow ochre, 1; alcoholic varnish, 1. Mix.

**To make Iridescent.** Make the following solution: Lead acetate, 2 parts; sodium hypophosphite, 6; water, 100. Mix, and heat to boiling. When in active ebullition plunge the object in it and keep until the desired tints are obtained. Dry and varnish. The copper takes on successively, grey, violet, chestnut, red, and finally blue.

**Bronze.** First tin the copper by boiling in a weak solution of acid potassium tartrate, in which granulated tin has been placed. Wash, dry and warm until the desired tint has been obtained.

**ZINC. Black.** Clean the zinc by dipping in an acid, rinse and plunge into the following: (1) Nickel-ammonium sulphide, 4

parts; sulphuric acid, 1; water, 40. Mix. Wash the article and dry carefully. (2) Treat with an acidulated solution of antimony chloride, thus: Hydrochloric acid, 6 parts; antimony chloride, 10; alcohol, 100. Mix. When the desired shade is attained, dry and rub with some good drying oil. Give 2 or 3 coats.

*Green Patina.* Make the following solution: Sodium hyposulphite, 2 parts; sulphuric acid, 1; water, 20. Mix, filter off the precipitated sulphur and heat the filtrate. Plunge the object into the hot solution. Watch the coloration as it progresses, and when the desired tint is secured remove, let dry, and varnish with copal.

*To Bronze.* First cover with copper by galvanism, then wash with the following solution: Potassium oxalate, 8 parts; sal ammoniac, 30; vinegar, 1,000. Mix. Rinse and let dry.

**SILVER.** *To Blacken.* Plunge into a solution of an alkaline sulphide. The so-called pentasulphide of potassium and ammonium hydrosulphide are the best salts for this purpose. One-half of 1 per cent. is sufficient. Remove and rub with a brush, dipped in powdered cream tartar. (2) Rub the object with a solution of silver nitrate.

*Rose.* Immerse for a few seconds in a concentrated hot solution of copper chloride; rinse, dry, and immerse in alcohol. Finally dry off by holding near the fire.

*Brown.* To give silver a deep brown colour treat it with a solution of sal ammoniac and copper sulphate in equal parts, in vinegar.

**IRON AND STEEL.** *Bronzing.* Lay the object for a moment in a solution of iron perchloride and copper sulphate, with a little added nitric acid. Remove and dry at a temperature of about 30°C. (85°F.). Finally suspend in a close box containing a vessel of boiling alcohol, and leave for 20 minutes (keeping the alcohol boiling all the time). Scratch off with a scratch brush. Repeat the operation several times or until the desired tint is obtained.

*Blue Black.* Clean the object thoroughly, removing every trace of grease, then cover with the following solution: Copper sulphate, 8 parts; nitric acid, 15; alcohol, 30; water, 125. Mix, and dissolve. Let dry on, and when quite dry rub with a woollen cloth.

*Brilliant Black.* Boil the following together: Sulphur, 1 part; oil of turpentine, 10. While boiling, spread in a very light coating, by means of a pencil, over the surface, and heat in the flame of an alcohol lamp until black.

**Bronzing Gun Barrels.** Make the following solution: Solution of ferric chloride (sp. gr. 1.28), 14 parts; mercuric chloride, 3; fuming nitric acid, 3; cupric sulphate, 3; water, 80. Mix. With a brush or pencil go over the barrels with this liquid. Let dry on, then scratch off with the scratch brush. Repeat this two or three times. Finally plunge the barrels into a 1 per cent. solution of potassium sulphide and let remain for 10 days. At the end of the time wash in hot suds, dry off and cover with linseed oil, which let dry on.

**Copper from Driving Belts in Powdered Drugs.** E. H. Gane. (*Amer. Journ. Pharm.*, **74**, 289.) The source of contamination of a sample of powdered ammonium carbonate was traced to the copper rivets and copper wire stitches used in fastening the leather driving belts of the machinery employed for powdering the salt. [Since ammonium carbonate is usually powdered in this country by means of "horizontal" stones, the impurity, in this instance, is less likely to be met with. But it may explain the presence of copper in powdered vegetable drugs which are more usually comminuted under "chaser" stones over here.—Ed. *Year-Book*.]

**Corn Cure.** Gaucher's. (*Pharm. Post.*, **34**, 475.) Resorcin, 1 part; salicylic acid, 1; lactic acid, 1; flexile collodion, 10. To be applied once daily for 5 or 6 days. After a hot foot-bath the corn may then be easily removed.

**Corn Salve.** (*Pharm. Journ.*, [4], **14**, 486, after *Bull. of Pharm.*) Salicylic acid, 2 ozs.; ammonium chloride, 2 ozs.; acetic acid,  $\frac{1}{2}$  oz.; lanolin, 2 ozs.; white wax, 2 ozs.; lard, enough to make 1 lb. Mix the acid with the ammonium chloride, add the lanolin, and, lastly, the lard and wax previously melted. Mix thoroughly and pour into quarter-ounce tin boxes and allow to cool.

**Cosmetic Lotion.** (*Amer. Drugg.*, **40**, 245.) Borax, 4 drs.; potassium carbonate, 2 drs.; potassium chlorate, 2 drs.; glycerin,  $1\frac{1}{2}$  ozs.; orange flower water, 4 ozs.; rose water, 4 ozs. Mix. To be used several times daily.

**Cosmetic Skin Ointments.** H. Kuehl. (*Pharm. Zeit.*, through *Deutsch. Amer. Apoth. Zeit.*, **22**, 147.) (1) Lanoline, 30; oil of sweet almonds, 10; mix and add, borax, 1; dissolved in glycerin, 15; and hydrogen peroxide, 15. (2) White precipitate ointment, 5 Gm.; zinc ointment, 5 Gm.; lanoline, 30 Gm.; oil of sweet almonds, 10 Gm. Mix and add the following solution: borax, 2 Gm.; dissolved in glycerin, 30 Gm.; rose water, 10 Gm.; and strong nitric acid, 5 drops. This is thoroughly incorporated with the



ointment basis. The marked bleaching action of this ointment is ascribed to the minute trace of nitric acid. Either of the above may be perfumed with a drop of otto.

**Cosmetics, New.** (*Nat. Drugg.*, **31**, 307.) Franz Naffin contributes the following to the *Augsbürger Seifensieder Zeitung*:—

*Crème de Lanoline.* Adeps lanæ, 100 parts; distilled water, 120. Rub up together. To perfume use the following:—Oil of geranium, 10 parts; oil of clove, 2; anise-aldehyde, 5; linalyl acetate (bergamiol), 3. Work well in.

*Crème de Vaseline.* Vaseline, white, 500 parts; oil of sweet almonds, 100; white beeswax, 50; rose water, 50; cananga oil, 2; linalol, 2. Mix.

*Crème de Glycerine.* Soap, best white castile, 15 parts; glycerin, 75; almond oil, 500; wax, white, 30; oil of thyme, 3; oil of bergamot, 3; oil of cloves, 1. Dissolve the soap in the glycerin by the aid of heat. Melt the wax and almond oil together and mix. Let cool down somewhat before adding the perfume.

*Glycerine de Toilette.* Borax, 5 parts; rose water, 150; glycerin, 350.

**Cosmetoline.** (*Oester. Zeits. für Pharm.*, **55**, 862.) Lanoline, 13 parts; glycerin, 13; simple tincture of benzoin, 4; boric acid, 1.75; otto, q.s.

**Cut Flowers, Preserving in Water.** A. Petts. (*Gard. Chron.*, **22**, 232.) Some flowers will not keep well in water even for one day. Not only does the blossom not last, but the whole thing withers as if the stalk did not reach the water. By the knowledge of a few simple facts much disappointment and vexation of this sort may be avoided. In the first place, all flowers should be put in water as soon as they are cut. If left out of water for some time, the flowers are parting with their moisture, and not only have they to make up lee-way when put in water, but the cut ends get dried and shrivelled, with the result that some of them have a much lessened power of absorption. Where this has happened, a half-inch or so should be cut off the ends of the stalks immediately before putting them in water. This is an excellent thing to do with flowers which have been travelling, and in addition to this it is advisable to immerse them for an hour or two in a pail of water up to their heads—if the water is tepid so much the better. Some flowers, like poppies, stephanotis, convolvulus, and some campanulas, which have a milky juice, need a little extra care, as the juice sometimes solidifies as it dries at the end of the stalk, and so impedes the rise of water up the stem. For these and similar

flowers it is necessary to split the cut ends a little way immediately before putting them in water, when the milky juice is washed out. Lenten roses, and some perennial sunflowers and gaillardias, are often very unsatisfactory in water; but if the stalks are split a good way up, and the whole of the split portion kept in water, they will be found to last as long as anything else, and longer than many things. It is the flowers with woody stems that often present the greatest difficulty—lilac, gueldres-rose, spiræa, tall pieces of perennial phlox, etc. In addition to cutting the ends off the stalks immediately before putting them in water, some recommend peeling the bark off for a couple of inches from the end; some, slitting the stems a little way up; some, loosening the bark for an inch or so, but not removing it; and others, cutting the ends off with a long slanting cut. All these are more or less effectual preparations of woody-stemmed flowers for vases, some answering better to one form of treatment, and some to another. Some of the water-loving flowers, too, are difficult to keep alive. Our English horse-tails (*equisetums*), some of the tall water-reeds, the water plantain, and many others, will only succeed, when cut, if several inches of the stem be immersed, and little notches made along the stem so immersed; one notch in the upper part of each internodal portion, so as to let the hollow stem be filled with water. Though it is a very bad practice to recommend, there are some wild flowers which almost refuse to live in water unless a portion of the root is pulled up with them. This is notably the case with scarlet poppies, which, if gathered in this way—the whole stem with a piece of the root attached—will live well, and many unopened buds will unfold.

**Cucumber Juice.** (*Pharm. Journ.*, [4], **14**, 485, after *Bull. of Pharm.*) Slice any convenient number of cucumbers, without peeling: place in a porcelain kettle, and add just enough water to keep from burning. Cook until pulpy, and strain with force through muslin. This preparation may be preserved by the addition of boric or salicylic acid.

**Cytotoxins.** Metchnikoff. (*Oester. Zeits. für Pharm.*, **55**, 523.) The term cytotoxin has been applied to poisonous substances which are obtained from the organs or secretions of animals. The known cytotoxins include heptotoxin from the liver, nephrotoxin from the kidneys, trichotoxin from the epithelium of the hair, leucotoxin from the lymphatic ganglia, spermatotoxin from spermatozoa, hæmatoxin from defibrinated blood, and neurotoxin from nervous substance. Cytotoxin is obtained by injecting an

emulsion of the organ into an animal of another species. The serum obtained from the blood of this animal is then extremely toxic for the species which furnished the original organ injected.

**Dandruff Lotion.** (*Amer. Drugg.*, **40**, 245.) Salicylic acid, ʒi.; glycerin, ʒij.; eau de Cologne, ʒiiij.; distilled alcohol, ʒvj. Mix. The head is to be shampooed twice a week with a mixture of one part of the lotion and five parts of lukewarm water. Dry with a coarse towel and brush well with clean brushes.

**Drying Plants, Two New Methods of.** A. Choros Chkow and Jegorow. (*Pharm. Centralh.*, **42**, 613.) The first-named author advocates the substitution of cotton wool for the ordinary drying paper. Pads are made of sheets of wool, which are covered on both sides with tissue paper gummed at the edges. The plants are laid between these and pressed in the well-known lattice press, which is hung up in a well-ventilated place, or over a stove for a few days. With succulent plants, the pads require turning from time to time. Jegorow abandons the use of a press during drying entirely, only employing it in the last stages of the process, to flatten in dry specimens. A metal cylinder 50 Cm. high and 35 Cm. in diameter, is made of perforated galvanized iron, and covered with strong linen. The plants to be dried and spread out between sheets of bibulous paper, which is then rolled up tightly round the cylinder, and bound round with a strong linen cover. The cylinder is then stood on a tripod and heated over a charcoal brazier or a petroleum stove until it is too hot to be handled. The specimens will be dry in 60 to 90 minutes. They are then taken out and flattened by pressure in an ordinary press. Thus prepared, the bright natural colours are admirably preserved.

**Eau de Quinine.** (*Pharm. Zeit.*, **46**, 286.) (1) Balsam of Peru, 2 parts; castor oil, 6; rum, 60; water, 35; tincture of cinchona, 5. Mix and filter. (2) Quinine hydrochloride, 1 Gm.; tincture of capsicum, tincture of cantharides, of each, 2 Gm.; tincture of rhatany, 5 Gm.; Hoffmann's balsam, compound spirit of angelica, of each, 5 Gm.; glycerin, 20 Gm.; dilute alcohol, (68 per cent.), 160 Gm. (3) Quinine, 20 Cgm.; tannin, 1 Gm.; glycerin, 7 Gm.; distilled water, 20 Gm.; alcohol, 70 Gm.; balsam of Peru, 2 Gm.; tincture of cochineal, q.s. (4) Quinine, 20 Cgm.; tincture of cantharides, 2 Gm.; glycerin, 15 Gm.; spirit of lavender, 10 Gm. Mix and filter. (5) Glycerin, tincture of cinchona, of each, 25 Gm.; geranium oil, sweet orange oil, of each, 3 Gm.; alcohol, 600 Gm.; rose water, 350 Gm. Mix, tint red with alkanet root and filter. (6) Boil quillaia bark, 500 Gm., in distilled water,

4 litres; strain and add alcohol (90 per cent.), 5 litres; tincture of vanilla, 350 Gm.; glycerin, 300 Gm.; sodium bicarbonate, 100 Gm.; bitter orange oil, 100 Gm.; geranium oil, 50 Gm.; clove oil, 20 Gm. Colour with cochineal or alkannin tincture. Filter.

**Engravings, to Clean.** (*Nat. Drugg.*, **31**, 280.) To clean copper-plate engravings that have become soiled and stained, proceed as follows: Wash the plate on both face and back, with water carrying 4 per cent. of ammonium carbonate in solution, using a soft sponge for the purpose. Rinse each side separately with clean water. Go over the surfaces again with water slightly acidulated with white-wine vinegar, and rinse off with water in which a trace of calcium chloride has been dissolved. Dry in the free air and if possible in direct sunlight. If properly done the paper will be as white and bright as when first made.

**French Polish.** (*Pharm. Journ.* [4], **14**, 168.) Orange shellac, 2 lbs.; pale amber resin, 6 ozs.; oxalic acid,  $\frac{1}{4}$  oz.; wood naphtha, 1 pint; methylated spirit, 3 pints. Crush the shellac, resin, and oxalic acid, dissolve them in the mixed spirits with frequent stirring, and, when solution is complete, strain the polish through muslin.

**Foaming Dentifrices.** (*Amer. Drugg.*, **40**, 77.) *Quillaia Dentifrices.* (1) Powdered quillaia,  $\text{ʒij}$ ; glycerin, fl.  $\text{ʒiss}$ .; sodium salicylate,  $\text{ʒij}$ ; oil bergamot, fl.  $\text{ʒss}$ .; oil wintergreen, fl.  $\text{ʒss}$ .; oil of cloves, gtt. x.; alcohol, fl.  $\text{ʒi}$ .; solution of carmine, N. F., q.s.; diluted alcohol, fl.  $\text{ʒxvi}$ . Macerate the soap bark with the glycerin and twelve ounces of diluted alcohol, and percolate. Dissolve the oils in the alcohol and add the solution to the percolate, followed by the sodium salicylate and sufficient solution of carmine N. F. to impart the desired shade of colour. Shake thoroughly and filter through wet talcum, returning the first portions of the filtrate until the remainder runs through clear. Make up the bulk to one pint with diluted alcohol.

2. Powdered quillaia,  $\text{ʒij}$ ; powdered cinnamon,  $\text{ʒiij}$ ; alcohol,  $\text{ʒx}$ .; water,  $\text{ʒx}$ .; ground red sandalwood, gr xx. Macerate the ingredients named for four days, then transfer to a flask and boil for one minute. Allow to cool and filter, passing sufficient water through the filter to make the filtrate measure twenty ounces. Then add: Glycerin, fl.  $\text{ʒiv}$ .; oil peppermint,  $\text{m̄x}$ .; oil wintergreen,  $\text{m̄v}$ .; oil anise,  $\text{m̄v}$ .; oil rose,  $\text{m̄ij}$ .; creosote,  $\text{m̄ij}$ . Allow to stand three or four days before filtering.

**Saponaceous Dentifrices.** (1) Castile soap shavings,  $\text{ʒxij}$ ;

potassium carbonate,  $\text{ʒiiss.}$ ; powdered rhatany,  $\text{ʒi.}$ ; glycerin, fl.  $\text{ʒxxx.}$ ; white sugar,  $\text{ʒxxx.}$ ; water, q.s.; alcohol, cong. i.; cinnamon oil, true, fl.  $\text{ʒss.}$ ; oil wintergreen, fl.  $\text{ʒvi.}$ ; anise oil, fl.  $\text{ʒvi.}$ ; clove oil, fl.  $\text{ʒiv.}$ ; peppermint oil, fl.  $\text{ʒiv.}$  Dissolve the potassium carbonate in cold water, one gallon, and add the soap, stirring until solution is effected. In another gallon of cold water place the sugar, glycerin and powdered rhatany, and to this add the solution of soap and the flavouring oils, the latter previously dissolved in the alcohol. Lastly add sufficient cold water to make five gallons. Set aside and shake occasionally during two weeks. Allow the mixture to remain at rest two weeks more, then siphon off the clear solution and filter the remainder.

2. Castile soap shavings,  $\text{ʒiiss.}$ ; glycerin, fl.  $\text{ʒiv.}$ ; deodorized alcohol, fl.  $\text{ʒvi.}$ ; hot water, fl.  $\text{ʒvi.}$ ; oil peppermint,  $\text{ʒxx.}$ ; oil wintergreen,  $\text{ʒxxx.}$ ; clove oil,  $\text{ʒx.}$ ; vanilla extract, fl.  $\text{ʒss.}$ ; carmine solution, N. F., q.s. Dissolve the soap in hot water; add the glycerin and the vanilla extract. Dissolve the oils in the alcohol. Mix and add sufficient carmine solution to produce the desired shade of colour. Allow to stand for 24 hours, then filter through paper sprinkled with a little animal charcoal.

**Furniture Polish.** (*Pharm. Journ.* [4], **14**, 486, after *Bull. of Pharm.*) Linseed oil, 20 ozs.; spirit of turpentine, 12 ozs.; solution of antimony chloride, 1 oz.; vinegar, 8 ozs.; wood alcohol, 3 ozs.; camphor,  $\frac{1}{4}$  oz.; ammonium chloride, 3 drs. Dissolve the camphor in the spirits, and the ammonium chloride in the vinegar. Mix the other ingredients with this in the order given. Shake for some time to secure a smooth, creamy mixture.

**Furniture Polishes.** Twisselmann. (*Pharm. Zeit.*, through *Nat. Drugg.*, **31**, 380.) (1) Shellac, 180 parts; sandarac, 15; mastic, 16; copal, 16; colophony, 15; methylated spirit, 1,300. Mix, set aside in a warm place for several days, or until dissolved, giving an occasional agitation. Then filter. Many of the aniline dyes readily dissolve in the liquid, and may be added thereto when it is desirable. This is for use on more costly objects, such as cabinets, etc. The article is first carefully cleaned, and the polish is applied with soft brushes. It should be as "thin" as possible when applied, and should be diluted with acetone.

2. Shellac, 4 parts; alcohol (methylated), 32; carbon disulphide, 1; peanut oil, q.s. Mix the carbon disulphide with the alcohol, and dissolve the shellac in the mixture. Filter the solution, and to every 35 parts of the filtrate add 100 parts of peanut oil, 65

parts of tincture of benzoin, and 5 parts tincture of myrrh. Clarified cotton-seed oil may be used instead of peanut oil.

3. Alkanet root, cut up, 25 parts; linseed oil, 250. Heat in the water bath slowly together until the colour of the root is extracted, and strain through cloth. To the colate add 35 parts carbon disulphide, 3 parts oil of lavender, and 220 parts of wood alcohol.

**Glycerin Cream.** F. Naffin. (*Pharm. Post.*, **34**, 475, after *Angsb. Seifsid. Zeit.*) White olive oil soap, 15 parts; glycerin, 75; sweet almond oil, 500; white wax, 30; thyme oil, 3; bergamot oil, 3; clove oil, 1. Dissolve the soap, previously shredded, in the glycerin, with gentle heat, then add the wax and oil, previously melted together, and mix, finally adding the perfumes.

**Gutta Percha Stopping for Hollow Teeth.** F. A. Howarth. *Pharm. Journ.* [4], **12**, 368.) This is made by dissolving pure gutta percha in five times its weight of chloroform and allowing to deposit. The clear solution is poured on zinc oxide (twice the quantity of gutta percha taken), made into a paste and finally spread into sheets, which are allowed to dry.

**Hæmatogen.** (*Pharm. Centralh.*, **43**, 172.) The following is stated to give a preparation identical with hæmatogen. Hæmoglobin extract, 100 parts, is dissolved in a tepid mixture of water, 150; glycerin, 30; brandy, 20; to this is added benedictine essence, 0.3. The mixture allowed to stand for a few days with frequent agitation.

**Hair Curling Liquids.** (*Pharm. Zeit.*, **46**, 286.) (1) Resin, 12; alcohol (90 per cent.), 1,000; perfumed with bergamot and musk, q.s. (2) Potassium carbonate, 15; solution of ammonia, 5; glycerin, 30; rose water, 750; orange-flower water, 200. (3) Potassium carbonate, 7; solution of ammonia, 3.5; glycerin, 15; alcohol, 42; diluted to 600 with rose water.

**Hair Wash, Saponaceous.** Dieterich. (*Deutsch. Amer. Apoth. Zeit.*, **22**, 74, after *Pharm. Rund.*) Spirit of soap, 200 Gm.; glycerin, 100 Gm.; rum, 50 Gm.; spirit of lavender, 50 Gm.; alcohol (90 per cent.) 350 Gm.; rose water, 250 Gm.; vanillin, 10 Cgm.; wintergreen oil, 2 drops; red sandalwood powder, 5 Gm. Mix, macerate for two days, and filter.

**Hair Wash, Stinging Nettle.** (*Deutsch. Amer. Apoth. Zeit.*, **22**, 74.) Fresh stinging nettles, 1000 Gm., are crushed and macerated with gentle heat for eight days with alcohol (90 per cent.), 2,000 Gm., then strained and pressed. To the liquid thus obtained are added, Peruvian balsam, 3 Gm.; bergamot oil, ylang-

ylang oil, heliotropin, and tincture of musk, of each, 1 Gm.; rose oil, 12 drops. After allowing to stand for another eight days the mixture is filtered.

**Hair Washes for Falling Hair and Scurf.** (*Pharm. Zeit.*, 46, 286.) (1) Resorcin, 5 parts; alcohol, 150; castor oil, 20; eau de Cologne, 25. (2) Hebra's alkaline spirit of soap, brandy, solution of borax (1: 25), of each 100 Gm. The yolk of one egg. Mix. (3) One of the best remedies for scurf consists in washing the head daily with a 5 or 6 per cent. solution of soda or pearlash, and then applying a pure hair oil. (4) Wash the hair in the evening with a lanoline soap, dry thoroughly before the fire, then moisten well with some of the following:—Acid, salicylic, 5; castor oil or glycerin, 5; rectified spirit, 200. (5) Hydrochloric acid, 5; alcohol, 50. Rub the hair with a little of the acid hair wash every evening. (6) Pilocarpine hydrochloride, 2 Cgm.; spirit of mustard, 10 drops; tincture of cantharides, 10 drops; balsam of Peru, 2·5 Gm.; tincture of Indian hemp, 2·5 Gm.; quinine hydrochloride, 2 Gm.; rectified spirit to make 200 Gm. To be applied night and morning, washing the head every second day with Hebra's alkaline soap spirit. If the hair is scurfy this may be removed by frequent washing with a 4 per cent. solution of borax. (7) Chloral hydrate, 10; distilled water, 200; glycerin, 20. (8) Resorcin, 2·5; chloral hydrate, tannin, of each, 5; simple tincture of benzoin, 1·5; castor oil, 4; rectified spirit, to 250. (9) Liquid thiol, 5; rose water, 95. To be applied twice a week. (10) Mercuric chloride, 20 Cgm.; distilled water, 50 Gm.; alcohol, 150 Gm.; glycerin, 20 Gm.; Hoffmann's balsam, 20 Gm. (11) Resorcin, 5 Gm.; mercuric chloride, 20 Cgm.; castor oil, 15 Gm.; alcohol (96 per cent.), 200 Gm.; oil of bergamot and lemon, q.s. to perfume. (12) Mercuric chloride, 20 Cgm.; resorcin, 5 Gm.; rectified spirit, spirit of soap, of each, 200 Gm.; distilled water, 100 Gm.; tincture of cinchona, 20 Gm.; castor oil, 50 Gm. Label "Shake the bottle." To be rubbed into the scalp night and morning; a little hair oil to be used as well every fourth or fifth day. (13) Resorcin, 1 to 2; chloral hydrate, 1·5 to 3; tannic acid, 1·5 to 3; simple tincture of benzoin, 1 to 1·5; castor oil, 5; alcohol (90 per cent.), to 100. To be applied every night to the scalp.

**Naphthol Hairwashes.** (1)  $\beta$ -naphthol, 2·5 Gm.; glycerin, 95 Gm.; wintergreen oil, 2·5 Gm.; rose oil, 1 Gm.; neroli oil, 1 Gm.; orris oil, 5 drops; heliotropin, 1 Cgm.; quillaia tincture, 900 Gm. Mix, allow to stand a day, then filter. (2)  $\beta$ -naphthol, 2·0 Gm.; glycerin, rum, of each, 100 Gm.; alcohol (90 per cent.), 280 Gm.;

orange flower water, 100 Gm.; distilled water, 400 Gm.; bergamot oil, 1 Gm.; rose oil, 0.5 Gm.; vanillin, 0.1 Gm.; oil of *Mentha crispata*, 2 drops. Mix and filter. (3) Alcohol (96 per cent.), 50; glycerin, 30; green soft soap, 100; alcohol (68 per cent.), 800;  $\beta$ -naphthol, 5.

**Hairwash for Loss of Hair.** Twisselmann. (*Pharm. Centralh.*, **43**, 210.) The scalp, after washing with a superfatted soap, and drying, is damped with a little of the following mixture every evening: Rectified spirit, 10 parts; tannin, 5; eau de Cologne, 2; spirit of mustard, 10; brandy, 80.

**Hectograph Ink and Basis.** (*Pharm. Centralh.*, **42**, 510.) *Ink.* A mixture of water, 200 parts, and (methylated) spirit, 30, is saturated with the required aniline dye (30 or more) by allowing to stand in a warm place for a few days. The solution is then weighed, the spirit is evaporated off and the residue made up to the original weight by the addition of water, 0.4 per cent. of phenol is added, and the whole filtered. *Hectograph Basis.* (1) Glue, 250; water, 250 to 300; glycerin, 1,000. (2) Glue, 300; water, 500; glycerin, 1,100. (3) Glue, 140; water, 560; glycerin, 800; evaporate on the water bath to 1,100. (4) Sugar, 75; gelatin, 450; water, 680; glycerin, 1,425. (5) Gelatin, 125; water, 335; glycerin, 590. (6) Gelatin, 100; water, 220; glycerin, 520. (7) Gelatin, 730; glue, 700; water, 1,700; glycerin, 5,430. Evaporate to 8,000 on the water bath. These masses may be kept ready for use in wide-mouth well-closed jars.

**Herbarium, the Preparation of a.** P. E. F. Perrédès. (*Pharm. Journ.* [4], **12**, 336.) This paper, written by a practical field botanist, will prove full of useful information to the intending collector, and contains, as well, many practical hints useful to those with some experience in plant collecting. The note is not suitable for abstraction and should be consulted in the original.

**Horticultural Insecticides.** A. Larbalétrier (*L'Union Pharm.*, **43**, 71.) gives the following list of remedies for American blight, but the majority are, as well, general insecticides, which, when suitably employed, are serviceable for thrips, aphids and mealy bug. A strong decoction of the leaves of *Ruta graveolens*, obtained by macerating the leaves of the plant in soap and water, is stated by Forney to be so successful a remedy for American blight that he recommends that several plants of rue should be grown in every garden or orchard for use as an insecticide. It is applied with a brush or as a spray. *Lysol*, in a 1 per cent. dilution, has been recommended by Schiller Tietz to be brushed on the trunks and branches of the trees in spring. According to de



Lignièrès, the mixture of *higher boiling alcohols and pyridine bases*, which is a bye product in the distillation of alcohol, and which is therefore very cheap, is an excellent insecticide. One part of this mixed with an equal quantity of soft soap, forms the substance employed. In winter, or as soon as the leaves have fallen so as to allow the infested parts to be readily seen, a 10 per cent. solution of this is applied with a spray to the trunk, branches, or preferably the whole tree. Walls and surrounding soil should also receive a spraying. In the spring a second spraying with a 7.5 per cent. solution should be given. Lourdel recommends for the purpose *creolin* in the following proportions: Creolin, 35; soft soap, 35; water, 1,000. The creolin should be dissolved with the soap before adding the water. The whole tree, including the upper portion of the roots, should be washed with this mixture in winter. Pannecièrè applies the following to the fluffy tufts of the blight, in May or June: Water, 10,000; acetic acid, 1,000; salicylic acid, 2; mercuric oxide, 1; fuchsine, 25.

**Hydrogen Peroxide an Antidote for Cyanide Poisoning.** O. Hertig. (*L'Union Pharm.*, **43**, 53.) Merck recommends the employment of hydrogen peroxide in the "first aid" treatment of cases of cyanide poisoning on the theoretical grounds of the formation of the harmless oxamide, according to the equation  $2\text{HCN} + \text{H}_2\text{O}_2 = \text{COONH}_2.\text{COONH}_2$ . A 30 per cent. solution is employed for internal administration, and a 3 per cent. injection for subcutaneous use. The remedy has been successfully employed in cases of cyanide poisoning among gold miners who handle large quantities of potassium cyanide solutions. From these the danger of poisoning usually arises from the inhalation of HCN, to treat which the works' chemists or foremen might easily be instructed in the manner of administering the needful hypodermic injection.

**Hydrogen Peroxide as a Milk Preservative.** Jablin-Gonnet. (*Annal. Chim. Analyt.*, **6**, 129.) Hydrogen peroxide, 12 volumes, neutralized with  $\text{CaCO}_3$ , is recommended as a milk preservative. It is stated to be tasteless and quite harmless. The admixture in the proportion of 1:1,000 will enable milk to be kept perfectly sweet at  $20^\circ$  to  $30^\circ\text{C}$ . for two days; with 1:500 it will keep four days; and with 3:500 for six days. The addition may be detected by shaking out the milk whey with ether and applying the chromic acid test.

**Incrustation from the Stone Gallery of St. Paul's Cathedral.** E. G. Clayton. (*Proc. Chem. Soc.*, **17**, 201.) The balustrade of Portland stone around the dome of St. Paul's is greatly

weathered, and is coated with a layer of grey or black matter, which in some places attains the thickness of three-quarters of an inch. Chemical analysis shows it to consist chiefly of calcium sulphate, probably derived from the action of rain containing free sulphurous and sulphuric acids, derived from the smoke of the innumerable surrounding chimneys.

**Ice in the Sick-Room.** (*Nat. Drugg.*, **31**, 347.) A saucerful of shaved ice may be preserved for twenty-four hours, with the thermometer at 90°F., if the following precautions are observed: Put the saucer containing the ice in a soup-plate, cover it with another and place the plates thus arranged on a good heavy feather pillow, pressing them down into it. Now cover with another pillow, pressing it also down so that the plates are completely embedded in the pillows. The feathers with which the pillows are filled form an almost complete non-conductor of heat, and the ice thus isolated may be kept a very long time.

**Insecticide for Caterpillars.** (*Comptes rend.*, **134**, 1149.) J. Laborde. The following spray is recommended as an insecticide for caterpillars which infest fruit trees: Crude fir-tree turpentine, 1.5 kilo.; caustic soda, 200 Gm.; solution of ammonia sp. gr., 0.920, 1 litre; water, 100 litres. The crude fir-tree oleo-resin is heated with twice its weight of water in which the caustic soda has been dissolved; more water is added, and the solution is strained through a fine wire sieve to remove insoluble particles; when cold, the ammonia is added, and enough water to make the final volume 100 litres. The resulting liquid is sometimes clear, but more often opalescent, but it never throws down a precipitate. It is applied to the trees by spraying. It acts by stopping up the spiracles of the larvæ, producing asphyxia, and is stated to be quite harmless to growing plants.

**Jasmin Perfume, Development of in the Jasmin Flower.** A. Hesse. (*Chem. Ind.*, **25**, 1, through *Chem. Centr.*, **73**, 314.) As the result of his researches on the nature and formation of the odoriferous principles of jasmin flowers (see p. 97), the author concludes that the only rational method extraction to adopt is that of *enfleurage*. By this method about 1.784 per cent. of odorous principles are obtained, while, if the life of the flowers be destroyed by solvents soon after gathering, only about 0.2 per cent. results. The oil obtainable from jasmin, according to various authors, differs considerably in quantity and in composition. This is to be accounted for by the fact that the amounts of benzyl-acetate benzyl-alcohol, jasmone, etc., in the flower increase considerably

after twenty-four hours' *enfleurage*, and beside these indole, and the methylester of anthranilic acid are also formed. Erdmann has contradicted the statement made by the author that the methyl ester of anthranilic acid is not present, as such, in the fresh flowers. The author has, therefore, extracted fresh jasmin flowers with ether, petroleum ether, and alcohol; his results confirm his previous statement.

**Jewels and Violet Light.** Chaumet. (*Comptes rend.*, **134**, 1139.) The author finds that violet rays emitted by an arc light are valuable for testing certain jewels. Thus, diamonds of the best fire are not always those of the most regular form, but it is invariably found that the best stones show a marked, bright blue fluorescence with violet rays, while stones of less value are merely coloured violet. On exposing a remarkable yellow diamond to violet rays it was found to give no fluorescence, but, after the experiment, it was noted that the gem had lost its distinctive yellow colour and become dull brown, and therefore greatly depreciated in value. In twenty-four hours, however, the stone had resumed its normal colour and fire. With rubies, violet light affords a valuable means of differentiating between the products of the Burmese and Siamese mines, which greatly resemble each other in physical characters, although differing in intrinsic value. Siamese rubies are found to give only a slight fluorescence with violet rays, while stones of Burmese origin are fluorescent and sparkle with an intense red fire, which is quite distinctive, and enables them to be picked out when mixed with Siamese gems.

**Lanoline Cream.** F. Naffin. (*Pharm. Post*, **34**, 475, after *Augsb. Seifensied. Zeit.*) Anhydrous woolfat, 1000, is melted and rubbed down with water, 1,200, then perfumed with African geranium oil, 10; clove oil, 2; anise aldehyde, 5; linalyl acetate, 3.

**Lavender Water.** (*Pharm. Journ.* [4], **14**, 168.) Oil of lavender (Mitcham), 3½ fl. ozs.; essence of bergamot, 1 fl. oz.; essence of musk, ½ fl. oz.; Tonquin beans, 2 ozs.; rectified spirit, 6½ pints. Crush the Tonquin beans and add to the other ingredients, previously mixed. Set aside for a few days, with occasional agitation, then add distilled water, 1½ pints, and, after shaking well, put aside for some weeks before filtering.

**Leather, Varnishes and Paints, Black and White.** (*Nat. Drugg.*, **31**, 345.) The *Augsbürger Seifensied. Zeit.* gives the following varnishes, black and white, for belts, boot-tops, etc.: -

**Black Leather Varnishes.** (1) Shellac, 1 part; turpentine, 5;

prepared spirit, 15. To prepare the spirit add to every 15 litres of alcohol (wood) 500 Gm. of extract of logwood and 25 Gm. of potassium dichromate, and dissolve: then add the shellac and turpentine. (2) Ruby shellac, 30 parts; Venice turpentine, 1; sandarac, 1; castor oil, 1; alcohol, 150; levelin black, 5. (3) Rosin, 3 parts; turpentine, 3; oil of turpentine, 3; sandarac, 6; shellac, 12; lampblack, 1.5; alcohol (90 per cent.), 90. Rub up the lampblack with a portion of the alcohol, and with the rest of it dissolve the other ingredients.

*White Paint for Military Accoutrements.* Glue (best white), 1,500 parts; gum arabic, 500; water, 6,500; acetic acid (5 per cent. solution), 175; precipitated chalk, 2,000. Soak the glue and gum arabic in the water for one day, then melt in the water bath and add the acid under agitation. Finally, rub up the chalk and pour the mixture through very coarse muslin or a fine sieve. Dilute with water according to the season.

*Dressing for White Shoes.* Glue (best white), 500 parts; gum arabic, 500; precipitated chalk, 750; water, 3,225; citronella oil, 50. Prepare as above.

*Lightning Renovator.* (*Pharm. Journ.* [4], 14, 486, after *Bull. of Pharm.*) Stronger ammonia water, 1 oz.; tincture of green soap, 3 ozs.; sodium carbonate, 2 drs.; sodium borate, 2 drs.; ether, 1 oz.; alcohol, 1 oz.; water, enough to make 2 pints. Dissolve the salts in a portion of the water, and add the ammonia water and tincture of soap; finally add the ether and alcohol mixed. This removes stains from all kinds of woollen goods, brightens black cloth, renovates carpets, etc.

*Lilac Glycerin Lotion.* (*Amer. Drugg.*, 39, 377.) Glycerin, 8 ozs.; water, 8 ozs.; sodium borate, 2½ drs.; extract of lilac, sufficient to perfume. Mix. Colour a light violet tint.

*Lime Cream.* (*Pharm. Journ.* [4], 14, 168.) Almond oil, 1½ lb.; solution of potash, 1¼ fl. oz.; oil of lemon, ¼ fl. oz.; water, 4 fl. ozs. Add four-fifths of the solution of potash to the oil, shake thoroughly, then add the water gradually, shaking after each addition. Next add the remainder of the solution of potash, shake well, then add the oil of lemon, and again shake thoroughly.

*Linoleum Polishes.* (*Nat. Drugg.*, 31, 222.) The *Bulletin de la Société Royale de Pharmacie de Bruxelles* gives the following directions for keeping linoleum mats bright:—Treat first with a mixture in equal parts of milk and water. Let this dry on the surface, then apply one of the following mixtures: (1) Yellow wax, 15 parts; oil of turpentine, 33; amber varnish,

15. (2) Palm oil, 3; paraffin, 54; kerosin, 12. (3) Yellow wax, 3; Carnauba wax, 6; oil of turpentine, 30; benzin, 30. If the mat is subjected to much service the first preparation appears to be the best, while if but light, either of the others will answer.

**Lip Salve.** (*L'Union Pharm.*, **43**, 70.) Hard paraffin, 160 parts; vaseline, 160; alkannin, 1; oil of bergamot, 2; oil of lemon, 2. Melt the paraffins together on the water bath, add the colour and the perfume, and run into suitable moulds or tubes.

**Liquid Cochineal.** (*Pharm. Journ.* [4], **14**, 168.) Carmine, 60 grs.; strong solution of ammonia, 6 fl. drs.; rectified spirit, 1 fl. oz.; distilled water, to 5 fl. ozs. Reduce the carmine to powder, add the solution of ammonia, mix thoroughly, then add 3 fl. ozs. of water, and, finally, the spirit. Shake well and allow to stand for some time, then filter, and add water to make up to the specified volume.

**Dentifrice, Liquid.** (*Pharm. Journ.* [4], **14**, 486, after *Bull. of Pharm.*) White Castile soap, 1 oz.; Cologne spirits, 6 ozs.; water, 6 ozs.; glycerin, 2 ozs.; oil of peppermint, 20 mus.; oil of cloves, 10 mns.; oil of cinnamon, 20 mns.; oil of winter-green, 30 mns.; extract of vanilla,  $\frac{1}{2}$  oz. Dissolve the soap in the water by the aid of heat, if necessary, and add glycerin and extract of vanilla. Dissolve the oils in Cologne spirits and add to the solution first formed. Then filter and colour red. Be sure the oils are fresh, and do not put in more than the quantities specified.

**Dentifrices, Liquid.** (*Pharm. Zeit.*, **46**, 608.) *Perfumed Mouth-Washes.* (1) Red sandal wood, guaiacum chips, of each, 250 parts; myrrh, cloves, of each, 150; cinnamon bark, 100; clove oil, peppermint oil, of each, 20; cochineal, 100; alum, potassium carbonate, of each, 1; strong alcohol, 15,000; rose water, 5,000. Macerate for eight days and filter. (2) Star anise fruits, cinnamon bark, cinchona bark, rhatany root, cloves, all freshly crushed, of each, 25; cochineal, anise oil, of each, 5; peppermint oil, 10; alcohol (68 per cent.), 2,000. Macerate for eight days and filter. (3) Guaiacum chips, pyrethrum root, star anise fruits, cloves, of each, 25 Gm.; vanilla, 10 Gm.; cinnamon oil, sassafras oil, of each, 10 drops; neroli oil, 5 drops; peppermint oil, 80-drops; alcohol (90 per cent.), 1,500 Gm.; cochineal, 10 Gm.; borax, 3 Gm.; rose water, 250 Gm. Macerate for eight days and filter.

*Antiseptic Mouth-Washes.* (1) Thymol, 10 Cgm.; carbolic acid, 5 drops; sassafras oil, winter-green oil, of each, 8 drops; rose geranium oil, eucalyptus oil, of each, 3 drops; calamus oil, 6 drops; mountain pine oil, 20 drops; glycerin, 60 c.c.; alcohol (90 per cent.), 135 c.c.; powdered soap, 7.75 Gm.; distilled water, q.s. to produce 500 c.c. The soap powder is dissolved in warm water, 150 c.c., the other ingredients except the glycerin in the alcohol; the spirituous solution is then added to the soap liquid. The mixture is then filtered through a little calcium phosphate, the glycerin added, and the mixture tinted by the addition of equal parts of carmine solution and tincture of Persian berries. (2) Thymol, 2; alcohol (96 per cent.), 200; glycerin, 20; chloroform, 10; peppermint oil, 2; lemon oil, 4; eucalyptus oil, 1. (3) Thymol, 1; benzoic acid, 12; tincture of eucalyptus, 60; alcohol (96 per cent.), 400; peppermint oil, 3. (4) Thymol, 15 Cgm.; glycerin, 50 Gm.; alcohol (70 per cent.), 80 Gm.; white soft soap, 5 Gm.; carbolic acid, 5 drops; sassafras oil, 8 drops; eucalyptus oil, geranium oil, calamus oil, of each, 5 drops; mountain pine oil, 20 drops; distilled water, 500 Gm.; caramel, q.s. to tint. (5) Almond oil soap, 150 Gm.; potassium carbonate, 50 Gm.; rhatany root, 30 Gm.; glycerin, 500 Gm.; saccharin, 5 Cgm.; alcohol (96 per cent.), distilled water, of each, 1,000 Gm.; cassia oil, 1 Gm.; winter-green oil, anise oil, of each, 15 Gm.; clove oil, peppermint oil, of each, 1.5 Gm. (6) Quillaja bark, 50; glycerin, 35; sodium salicylate, 5; alcohol (68 per cent.), 500; bergamot oil, clove oil, winter-green oil, of each, 1; solution of carmine, q.s. to tint. (7) Peppermint oil, 60 drops; spearmint oil, 30 drops; clove oil, 30 drops; cassia oil, 90 drops; tincture of litmus, 10 c.c.; tincture of myrrh, 3 c.c.; alcohol (90 per cent.), q.s. to make 500 c.c.

*Eau de Botot.* (1) Star anise fruits, 135 Gm.; cinchona bark, cassia bark, rhatany root, of each, 45 Gm.; cloves, cochineal, of each, 25 Gm.; vanilla, 10 Gm.; alcohol (90 per cent.), 4,000 Gm.; acetic ether, 90 Gm.; distilled water, 200 Gm.; cassia oil, 6 Gm.; peppermint oil, 22.5 Gm.; clove oil, 30 drops; star anise oil, 10 drops; neroli oil, rose oil, of each, 10 drops. (2) Anise fruits, 30 Gm., cloves, cassia bark, of each, 8 Gm.; cochineal, 2 Gm.; red cinchona bark, 15 Gm.; peppermint oil, 1.2 Gm.; alcohol (68 per cent.), 875 Gm. Macerate for eight days, filter and add tincture of ambergris, 4 Gm. (3) Anise fruits, 80 Gm.; cloves, 20 Gm.; cassia bark, 20 Gm.; cochineal, 4 Gm.; pyrethrum root, 10 Gm.; red cinchona bark, 25 Gm.; benzoin, 20 Gm.; alcohol (90 per

cent.), 1,875 c.c. Distilled water, 125 Gm.; peppermint oil, 8·75 Gm. Macerate for eight days and filter. (4) Anise fruits, 20; cloves, 20; cassia bark, 20; oil of peppermint, 10; cochineal, 5; vanilla, 1; alcohol (70 per cent.), 800; rose water, 200; tincture of ambergris, 10. (5) Alcohol (90 per cent.), 90 Gm.; simple tincture of guaiacum, 11 Gm.; tincture of cochineal, 7 Gm.; lemon oil, 10 drops; anise oil, clove oil, of each, 4 drops; oil of peppermint, 6 drops. (6) Anise fruits, 160 Gm.; cardamoms, 18 Gm.; cloves, 35 Gm.; cinnamon, 40 Gm.; vanilla, 3 Gm.; alcohol (90 per cent.), 1,100 to 1,200 Gm.; distilled water, 350 Gm. Macerate, strain, press, and add coumarin, 0·5 Gm.: Mitcham peppermint oil, 9 Gm. Tint with tincture of cochineal and q.s. caramel; filter. (7) Bergamot oil, sweet orange oil, of each, 16; lemon oil, 8; neroli oil, 2; cedrat oil, 8; rosemary oil, 2; clove oil, 10; cassia oil, 10; anise oil, 20; peppermint oil, 50; simple tincture of benzoin, 8; simple tincture of guaiacum, 150; alcohol (90 per cent.), 2,500; cochineal, alum, cream of tartar, of each, 30. Mix; macerate for eight days. (8) Cloves, 24 Gm.; star anise fruits, 90 Gm.; cassia bark, 24 Gm.; alcohol (90 per cent.), 1,000 Gm.; cochineal, 6 Gm.; cream of tartar, 1 Gm.; distilled water, 125 Gm. Macerate for eight days, then add peppermint oil, 20 drops. (9) Cinnamon bark, cloves, star anise fruits, powdered cochineal, of each, 30 Gm. Macerate for two days in alcohol (90 per cent.), 4 litres, then add simple tincture of benzoin, 45 Gm.; spirit of horse-radish, 95 Gm.; oil of peppermint, 45 Gm.; simple tincture of guaiacum, 2·5 Gm. Macerate for ten days with frequent agitation, then filter. (10) Anise fruit, 6; cloves and cinnamon, of each, 2; cochineal in powder, 0·5; cinchona bark, 3; peppermint oil, 1; alcohol (90 per cent.), 150. Macerate for eight days, then add tincture of vanilla, 1. (11) Resin of guaiacum, 1·5; cochineal, 1·5; cloves, 5·6; distilled water, 300; alcohol (90 per cent.), 1,200. Macerate for eight days, strain; press and filter, then add peppermint oil, 10; anise oil, 5. To every 100 Gm. of the product, thymol, 0·2 Gm.; tincture of myrrh and tincture of cinchona, of each, 2 Gm., may be added.

*Benedictine Dentifrice.* Mitcham peppermint oil, 300 Gm., anise oil, 50 Gm., calamus oil, 5 Gm., are macerated in alcohol (96 per cent.), 10 kilo. for eight days, cochineal, 50 Gm., is rubbed down with cream of tartar, 50 Gm., and added to the above, and after macerating for another eight days, filtered. Since cream of tartar is considered to be harmful to the teeth, an aniline carmine-substitute may be used instead of the cochineal and potassium

bitartrate, to reproduce the distinctive opalescent red of the original preparation.

*Pierre's Eau Dentifrice.* Macerate star anise fruits, 15 Gm., in alcohol (90 per cent.), 200 Gm., for three days, filter, and tint to a deep red with alkannin; then add oil of peppermint and oil of star anise, of each, 60 drops.

*Eucalyptus Mouth-Wash.* Thymol, 25 Cgm., tincture of eucalyptus, 15 Gm.; absolute alcohol, 100 Gm.; oil of peppermint, 1 Gm. Mix. A teaspoonful to be used with a glass of water.

*Koth's Dentifrice.* Peppermint oil, 1; dissolved in alcohol (94 per cent.), 200.

*Miller's Dentifrice.* Thymol, 25 Cgm.; benzoic acid, 3 Gm.; tincture of eucalyptus, 15 Gm.; absolute alcohol, 100 Gm.; winter-green oil, 25 drops. One teaspoonful to be used in half a wineglassful of water.

*Mentholin Mouth-Water.* Menthol, 2.5 Gm.; clove oil, 5.5 c.c.; peppermint oil, 57.5 c.c.; boric acid, 35 Gm.; tincture of myrrh, 135 c.c.; tincture of litmus, 60 c.c.; alcohol (90 per cent.), q.s. to make 1 litre. The menthol and boric acid are dissolved in 600 c.c. of the alcohol, the other ingredients added, and the solution filtered.

*Odol.* Alcohol (80 per cent.), 97 Gm.; salol, 2.5 Gm.; saccharin, 0.004 Gm.; peppermint oil, 0.5 Gm., with traces of clove and caraway oil.

*Priestley's Mouth-Water.* Alcohol (90 per cent.), 6 kilo.; water, 1.5 kilo.; lemon oil, 15 Gm.; American peppermint oil, 40 Gm.; fennel oil, 10 Gm.; rose oil, 25 drops.

*Salicyl Mouth-Wash.* Tincture of myrrh, 8 Gm.; salicylic acid, 5 Gm.; alcohol (90 per cent.), 500 Gm.; rose oil, 25 Cgm.; geranium rose oil, 50 Cgm.; tincture of musk, 2 drops; acetic ether, 1 Gm.; spirit of nitrous ether, 2 Gm.; glycerin, 12 Gm.; cochineal, 10 Gm.

*Salol Mouth-Wash.* This preparation is recommended for use for the inflammation of the mouth and throat commonly affecting smokers. (1) Phenol, salol, of each, 5 Gm.; peppermint oil, star anise oil, of each, 10 Gm.; alcohol (90 per cent.), 120 Gm. Mix; 5 to 10 drops in a tumblerful of water. (2) Salol, 1 Gm.; spirit of peppermint, 50 Gm.; tincture of catechu, 2 Gm.

*Saccharin Mouth-Wash.* (1) Saccharin, 2 Gm.; alcohol (90 per cent.), 200 Gm.; peppermint oil, 10 drops. (2) Salicylic acid, 6 Gm.; saccharin, 1.5 Gm.; sodium bicarbonate, 1.5 Gm.; eau de Cologne, 300 Gm.



*Foaming Dentifrice.* (1) Quillaia bark, 60 Gm.; glycerin, 45 c.c.; sodium salicylate, 17.75 Gm.; bergamot oil, 60 drops; winter-green oil, 60 drops; clove oil, 10 drops; alcohol (90 per cent.), 30 c.c.; carmine solution, q.s. to tint, and dilute alcohol (68 per cent.) to make up to 500 c.c. The dilute alcohol and the glycerin are mixed; the quillaia bark is first moistened with the mixture, and then percolated. The oils are dissolved in the stronger alcohol and mixed with the percolate, the salicylate is dissolved in the mixture to which enough carmine solution is added to tint it. The whole is then filtered through French chalk and made up to 500 c.c. with dilute alcohol. (2) Powdered white Castile soap, 35 Gm.; potassium carbonate, 75 Gm.; powdered rhatany root, 30 Gm.; glycerin, 1 litre; sugar, 1 kilo.; alcohol (90 per cent.), 4.5 litres; cassia oil, 15 c.c.; winter-green oil, 20 c.c.; anise oil, 20 c.c.; clove oil, 15 c.c.; peppermint oil, 15 c.c. The potash is dissolved in cold water, 4.5 litres, and the soap added to the solution. The oils are dissolved in the alcohol. The sugar and glycerin are dissolved in another 4.5 litres of water and the rhatany root added to it. This mixture is then added to the soap solution, followed by the alcoholic solution of the oils; enough water is then added to bring the volume up to 22.5 litres. This is allowed to macerate, with frequent agitation, for fourteen days, then allowed to deposit, without shaking, for another fourteen days, when the clear liquid is decanted and the deposit filtered out. (3) Soap powder, 45 Gm.; glycerin, 128 c.c.; alcohol (90 per cent.), 175 c.c.; warm water, 175 c.c.; peppermint oil, 40 drops; winter-green oil, 60 drops; clove oil, 20 drops; essence of vanilla, 15 c.c. The soap is dissolved in the hot water and the glycerin and vanilla extract added. The oils are dissolved in the alcohol; the solutions are mixed and tinted with solution of carmine; after standing for twenty-four hours it should be filtered through wood charcoal.

*Scheibler's Mouth-Wash.* Aluminium sulphate, 20 Gm.; sodium acetate, 25 Gm., are dissolved in distilled water, 300 Gm.; allowed to stand, with frequent agitation for twelve hours, then mixed with alcohol (90 per cent.), 100 Gm.; peppermint oil, 5 drops, and sage oil, 5 drops, with vigorous shaking. After filtration, distilled water, 200 Gm., is added.

*Thymol Mouth-Wash.* (1) Spirit of balm, 100 Gm.; tincture of myrrh, 5 Gm.; thymol, 0.5 Gm.; peppermint oil, 12 drops. Twenty to 30 drops to be used in a tumblerful of water. (2) Rhatany root, in powder, 500 Gm.; cassia bark, in powder, 100

Gm.; dried orange peel, 150 Gm.; alcohol (90 per cent.), 2,000 Gm.; distilled water, 1,000 Gm. Macerate for fourteen days, filter and add thymol, 15 Gm. (3) Thymol, 25 Cgm.; benzoic acid, 3 Gm.; tincture of eucalyptus, 15 Gm.; absolute alcohol, 100 Gm.; winter-green oil, 25 drops.

*Viau's Mouth-Wash.* Salicylic acid, 1; chloroform, simple tincture of benzoin, tincture of cassia bark, of each, 10 Gm.; aromatic spirit, 130 Gm. Two teaspoonfuls to be used to a tumblerful of water.

*Putze's Peroxide of Hydrogen Mouth-Wash.* Thymol, menthol, of each, 0.5 Gm.; absolute alcohol, 50 Gm.; tincture of rhatany, 30 Gm.; hydrogen peroxide (12 per cent.), 120 Gm. A few drops to be used with a tumblerful of water.

*Dentifrice Tablets.* (1) Heliotropin, saccharin, of each, 1 Cgm.; salicylic acid, 10 Gm.; menthol, 1 Gm.; sugar of milk, 5 Gm.; spirit of rose, q.s. to mass. Divide into 100 tablets. The mass may be tinted red with eosin, or green with chlorophyll, or blue with indigo-carmin. (2) Anise oil, 4 drops; cassia oil, 1 drop; lemon oil, 5 drops; cherry laurel oil, 1 drop; tincture of musk, 10 drops; clove oil, 4 drops; peppermint oil, 5 drops; powdered gum acacia, 5 Gm.; powdered sugar, 25 Gm. Compress into tablets without further addition.

*Lotion for Chapped Hands.* G. W. Hague. (*Amer. Drugg.*, **39**, 377.) Glycerin, soap liniment, of each, 2 ozs.; tincture of arnica, 1 oz.; water, 3½ ozs.; rose geranium oil, 20 drops; alcohol, sufficient to make 16 ozs.

*Lysol Mouth Washes.* (*Pharm. Zeit.*, **47**, 212.) (1) Alcohol (90 per cent.), 750; menthol, 3; lysol, 40; lemon oil, 20; peppermint oil, 30; clove oil, 2. (2) Lysol, 40; alcohol (90 per cent.), 500; tincture of myrrh, 100; spirit of horseradish, 80; peppermint oil, 20. Set aside for 8 days and then filter.

*Maraschino.* (*Deutsch.-Amer. Apoth. Zeit.*, **22**, 74, after *Pharm. Rundschau.*) Otto of rose, 3 drops; lemon oil, 2 drops; cinnamon oil, 2 drops; clove oil, 2 drops; sweet orange oil, 3 drops; bitter almond oil, 2 drops; tincture of vanilla, 18 Gm.; syrup of raspberries, 500 Gm.; rectified spirit, 750 Gm.; distilled water, 500 Gm.

*Medicinal Plants Cultivated in Great Britain.* F. Ransom. (*Pharm. Journ.*, **14**, 149.) An interesting note, historical, horticultural and practical. Should be perused in the original.

*Moustache Fixer* — “*Es ist erreicht.*” (*Oester. Zeit. für Pharm.*, **55**, 862.) Extract of malt, 20; alcohol (90 per cent.), 32; water, 344; salicylic acid, 1; perfume, q.s.

**Myrrh and Borax Tincture.** F. A. Howorth. (*Pharm. Journ.* [4], **12**, 369.) Glyc. boracis, 1 fluid part; tr. kramerizæ, 1; eau de Cologne, 3; tinct. myrrh, ad 24. One teaspoonful in half a tumblerful of water to be used occasionally.

**Nepenthes, Enzyme of.** S. H. Vines. (*Pharm. Journ.* [4], **12**, 639.) In a communication to the Linnean Society the author states that the digestive ferment of *Nepenthes* and of other plants, is a trypsin and not a pepsin. This conclusion has recently been called in question by Clautriau, who reasserts the peptic character of the enzyme. Among the final products of tryptic digestion is a substance termed tryptophan, which gives a pink or violet colour on the addition of chlorine water. By means of this tryptophan reaction, which is readily given by the products of a *Nepenthes* digestion, the author has been able to establish the correctness of the view that the enzyme is tryptic. The tryptophan reaction has also been found to be given by a number of extracts of plants which are known to contain a proteolytic enzyme; for instance, pineapple juice, papain, figs, germinating bean seeds, etc. It seems probable, therefore, that proteolytic digestion in plants is always tryptic. But there is this peculiarity about the trypsin of plants, that it has to work in an acid medium. It is suggested that the proteolytic enzyme of *Nepenthes* should be termed nepenthin, as that of the papaw is termed papain, and that of the pineapple bromelin. (Compare *Year-Book*, 1901, 221.)

**Nitrous Oxide, Improved Method of Preparing.** J. Mai. (*Berichte*, **34**, 3805.) To avoid the explosions which sometimes occur in the preparation of nitrous oxide from ammonium nitrate, the following method of manipulation is recommended: A mixture of glycerin, 20 Gm.; ammonium nitrate, 10 Gm.; strong sulphuric acid, 3 drops, is warmed first to 100°C. and then to 165°C. The evolution of nitrous oxide is very regular, the gas is passed through alkali and sulphuric acid to remove the traces of pyridine and carbonic acid which are present. The yield of nitrous oxide is quantitative.

**Obesity Pills.** Dieterich. (*Amer. Drugg.*, **40**, 138.) Potassium bromide, 10 Gm.; sodium bicarbonate, 20 Gm.; extract of bladderwrack, 20 Gm.; guaiacum wood, powdered, 40 Gm.; senega root, powdered, 40 Gm.; extract of dandelion, q.s.; divide into pills weighing 0.15 Gm. They should be sprinkled with powdered cinnamon, or, if to be silvered, should be dried at 20° to 25°C.

**Ointment for Brittle Nails.** (*Practitioner*, 68, 715.) An ointment composed of a mixture of tin oleate, 1, and cold cream, 7, is said to be an efficient application for brittle or spotted finger nails.

**Ointment for Chapped Hands.** (*Practitioner*, 68, 716.) Yellow mercuric oxide, 2 grs.; Peruvian balsam, 10 grs.; vaseline, 4 drs. Mix. To be applied night and morning. If itching is troublesome, the addition of 2 grs. of phenol may be made to the ointment.

**Orange Flower Cream.** (*Pharm. Journ.* [4], 14, 485, after *Bull. of Pharm.*) White wax,  $\frac{1}{2}$  oz.; spermaceti,  $\frac{1}{2}$  oz.; cocoanut oil, 1 oz.; lanolin, 1 oz.; oil of sweet almonds, 2 ozs. Melt in a porcelain dish, remove from the fire, and add orange flower water, 1 oz.; tincture of benzoin, 3 drops. Beat briskly until creamy. This is an elegant preparation, and is used in massage for removing wrinkles.

**Orpiment for Warts on Horses.** Matthiesen. (*Merck's Report*, 1901, 47, after *Deutsch. Thierarzt. Woch.*) Orpiment is one of the most effective applications for warts on horses, and is perfectly safe; it may be applied to any part of the body, since it adheres very firmly. It appears to act as a selective detergent on proliferous growths, causing warts to shrivel up and drop off, but not affecting the normal cutaneous tissue. The wart should be trimmed during the course of treatment, after which the orpiment should be applied with cotton wool or a spatula, being rubbed in until the whole morbid growth assumes a golden tint. For small warts two applications at 5 days' interval are sufficient.

**Perfumes, Formulæ for.** (†. Bott. (*Pharm. Journ.* [4], 14, 455.) *Orris Tincture.* Powdered orris, 8 ozs.; alcohol (90 per cent.), 20 fl. ozs. Macerate seven days, filter, and percolate residue with alcohol, sufficient to produce 20 ozs. of tincture.

*The King's Bouquet.* Clove oil, 10 mns.; bergamot oil, 60 mns.; tonquin grain musk, 1 gr.; coumarin, 10 grs.; concentrated rose water (1 to 40), 1 fl. oz.; benzoin tincture, 1½ fl. dr.; orris rhizome tincture, 2 fl. ozs.; civet, 2 grs.; almond oil, 5 mns.; alcohol (90 per cent.), 8 fl. ozs. Mix and digest for one month.

*Frangipanni Bouquet.* Grain musk, 10 grs.; sandal oil, 25 mns.; rose oil, 25 mns.; neroli oil, 30 mns.; vetivert oil, 5 mns.; powdered orris rhizome,  $\frac{1}{2}$  oz.; vanilla, 30 grs.; alcohol (90 per cent.), 10 fl. ozs. Mix and digest for one month. This is a lasting and favourite perfume.

*Canangu Bouquet.* Ylang-ylang oil, 45 mns.; grain musk,

3 grs. ; rose oil, 15 mns. ; tonka beans, 3 ; cassia oil, 5 mns. ; tincture of orris rhizome, 1 fl. oz. ; civet, 1 gr. ; bitter almond oil,  $\frac{1}{2}$  mn. ; storax tincture, 3 fl. drs. ; alcohol (90 per cent.), 9 fl. ozs. Mix, and digest one month.

*Ylang-Ylang.* Ylang-ylang oil, 10 mns. ; neroli oil, 5 mns. ; rose oil, 5 mns. ; bergamot oil, 3 mns ; grain musk, 1 gr. ; alcohol (90 per cent.), 10 fl. ozs. Mix, and digest for a fortnight.

*Iridia.* Coumarin, 10 grs. ; concentrated rose water (1 to 40), 2 fl. ozs. ; neroli oil, 5 mns. ; vanilla, 1 dr. ; almond oil, 5 mns. ; civet, 1 gr. ; ambergris, 3 grs. ; orris rhizome (powdered), 1 dr. ; alcohol (90 per cent.), 10 fl. ozs. Mix, and macerate for one month.

*White Rose.* Rose oil, 25 mns. ; rose geranium oil, 20 mns. ; patchouli oil, 5 mns. ; ionone, 3 mns. ; jasmin oil (synthetic), 5 mns. ; alcohol (90 per cent.), 10 fl. ozs.

*Iranian Essence.* Bergamot oil, 20 mns. ; lavender oil, 30 mns. ; clove oil, 20 mns. ; sandal oil, 30 mns. ; almond oil, 15 mns. ; rose oil, 25 mns. ; grain musk, 5 grs. ; coumarin, 10 grs. ; alcohol (90 per cent.), 10 fl. ozs. Mix, and macerate for a week or more.

*Javanese Bouquet.* Rose oil, 15 mns. ; pimento oil, 20 mns. ; cassia oil, 3 mns. ; neroli oil, 3 mns. ; clove oil, 2 mns. ; lavender oil, 60 mns. ; sandal oil, 10 mns ; grain musk, 2 grs. ; alcohol (90 per cent.), deodorized, 10 fl. ozs. ; water,  $1\frac{1}{2}$  fl. ozs. Mix, and macerate for fourteen days.

*Patchouli Extract.* Patchouli oil ; 60 mns. ; rose oil, 10 mns. ; limetta oil, 5 mns ; alcohol (90 per cent.), 10 fl. ozs. Mix.

*Lavender Water.* English lavender oil, 2 fl. drs. ; bergamot oil, 1 fl. dr. ; rhodium oil, 5 mns. ; rose oil, 10 mns. ; ambergris, 5 grs. ; Tonquin grain musk,  $1\frac{1}{2}$  gr. ; alcohol (90 per cent.), 10 fl. ozs. Mix, macerate for one month, and keep for two or three months before using.

*Lavender Water.* (Second Quality). Lavender oil (French), 2 fl. drs. ; rose water, 2 fl. ozs. ; alcohol (90 per cent.), 10 fl. ozs. Mix.

*Eau de Cologne.* (First Quality.) Rosemary oil, 10 mns. ; orange flower oil, 25 mns. ; orange oil, 20 mns. ; cedrat oil, 25 mns. ; bergamot oil, 15 mns. ; clove oil, 3 mus. ; alcohol (90 per cent.), 10 fl. ozs. Mix.

*Eau de Cologne.* (Second Quality.) Rosemary oil, 15 mns. ; lemon oil, 1 fl. dr. ; lavender oil, 15 mns. ; bergamot oil, 30 mns. ; orange oil, 20 mns. ; orange flower water, 2 fl. ozs. ; alcohol (90 per cent.), 10 fl. ozs. Mix.

*Carmelite Balm Water.* Melissa oil, 30 mns. ; sweet marjoram

oil, 3 mns. ; cinnamon oil, 10 mns. ; angelica oil, 3 mns. ; citron oil, 30 mns. ; clove oil, 15 mns. ; coriander oil, 5 mns. ; nutmeg oil, 5 mns. ; alcohol (90 per cent.), 10 fl. ozs. Mix.

Where musk, civet or ambergris are ordered in a perfume, these should be first rubbed down with pumice stone and a very little water, and warmed for a few hours, afterwards adding the alcohol. Musk is improved by the addition of a trace of acetic acid.

**Perfumes, New Formulæ for.** A. Engelhardt. (*Neueste Erfind. und Erfahr.*, through *Nat. Drugg.*, **31**, 380.) *Ess. Bouquet.* Tincture of orris, 250 parts ; tincture of vanilla, 100 ; tincture of benzoin, 40 ; bergamot oil, 50 ; tincture of styrax, 50 ; clove oil, 15 ; oil of palm-rose, 12 ; lemon-grass oil, 15 ; distilled water, 2,000 ; alcohol (95 per cent.), 8,000.

*Baissers du Printemps—Spring Kisses.* Oil of lemon, 2 parts ; bergamot oil, 10 ; essence of ambergris, 80 ; essence of jasmin, 300 ; essence of acacia, 100 ; essence of rose (triple), 300 ; essence of violet, 2,500 ; essence of rose, 2,500.

*Cedar of Lebanon.* Cedar wood rasped, 400 parts ; alcohol, deodorized, 2,500 ; essence of rose, 1,000.

*Bouquet d'Irland*—Otto of rose, 5 parts ; essence of vanilla, 450 ; essence of white rose, 5,000 ; alcohol, 100.

*Ylang-Ylang.* Clove oil, 6 parts ; sandal-wood oil, 6 ; palmarosa oil, 15 ; linaloe oil, 20 ; tincture of musk, 30 ; tincture of vanilla, 60 ; tincture of orris, 75 ; water, 1,000 ; alcohol, 4,000.

*Eau de Mille Fleurs.* Oil of clove, 2 parts ; oil of neroli, 2 ; otto of rose, 2 ; bitter almond oil, 5 ; oil of bergamot, 40 ; jasmin essence, 50 ; orange-flower essence, 250 ; abelmoschus essence, 250 ; cedar essence, 250 ; tube-rose essence, 250 ; rose essence, 300 ; essence of vanilla, 500 ; essence of violets, 500 ; essence of acacia, 500 ; esprit de rose (triple), 1,000.

*Jasmin.* Otto of jasmin, 3 parts ; bergamot oil, 3 ; linaloe oil, 2 ; jasmin essence, 200 ; water, 100 ; alcohol, 400.

*Kiss Me Quick.* Clove oil, 4 parts ; cedarwood oil, 5 ; bergamot oil, 5 ; geranium oil ; 8 ; essence of acacia, 1,000 ; water, 1,000 ; alcohol, 4,000.

**Pile Ointment.** (*Pharm. Journ.* [4], **14**, 168.) Galls, in powder, 1½ oz. ; camphor, in powder, 1 oz. ; opium, in powder, 90 grs. ; lead acetate, in powder, 60 grs. ; lard, 6 ozs. Mix the powdered opium and galls, then add the camphor, freshly powdered by the aid of rectified spirit, and allow the spirit to evaporate. Add the lead acetate to the dry powder and, finally, mix with the lard.

**Pile Ointments.** (*Bull. of Pharm.*, **5**, 527.) (1) "Distilled ex-

tract" of witch-hazel, 2 fl. ozs.; wool fat, 2 ozs.; petrolatum, 6 ozs.; glycerin, 4 fl. ozs.; tannic acid, 1 dr.; powdered opium, 1 dr. (2) Tannic acid, 20 grs.; bismuth subnitrate, 1 dr.; powdered opium, 10 grs.; wool fat, 3 drs.; petrolatum, 5 drs. (3) Extract of stramonium seed, 12 grs.; extract hyoscyamus, 24 grs.; poplar ointment to make 1 oz. (4) Powdered nutgalls, 1 dr.; powdered opium, 30 grs.; Goulard's cerate, 4 drs.; wool fat, 3 drs.; ichthyol, 1 fl. dr.; (5) Ichthyol, 1 part; petrolatum, 20 to 30. The following ointment has afforded most excellent results in the treatment of blind, bleeding, itching or protruding piles. (6) Powdered galls, 1 dr.; powdered extr. witch-hazel, 20 grs.; powdered extr. opium, 15 grs.; powdered extr. belladonna, 15 grs.; carbolic acid (crystals), 15 grs.; ichthyol, 30 mns.; petrolatum, 1 oz. Apply night and morning on a piece of cloth.

**Platinotype Paper, Imitation.** Von Loo. (*West. Drugg.*, through *Pharm. Journ.* [4], **12**, 342.) The paper is coated with the following solution:—Water, 1,000 parts; ferric oxalate, 15; oxalic acid, 3; silver nitrate, 3. The above proportions should be adhered to as nearly as possible to secure good results. The printing is carried out in the same manner as with platinum paper, that is, until the image is well distinguished. After printing, the paper is placed in a developing bath made up as follows:—Water, 1,000 parts; borax, 60; sodium tartrate, 60. Dissolve, and add several drops of a 5 per cent. solution of potassium bichromate; a greater proportion of bichromate gives an image hard and full of contrast; by using less, the image becomes grey and feeble. A certain latitude is thus given which is of advantage for negatives of different intensities. After the development, which lasts five or six minutes, the prints are washed for a few moments in running water, and the toning is carried out with the following bath:—Water, 1,000 parts; potassium chloroplatinite, 1; sodium chloride, 10; citric acid, 10. The prints are left in the bath until the desired intensity is obtained, and are then fixed in a 2 per cent. solution of ammonia; the fixing lasts about ten minutes. They are then washed thoroughly, as usual. This seems to resemble, in the required manipulation, a paper which was in vogue some years since, called "Kallitype," but this was prepared with silver only, and proved very unsatisfactory as regards permanence. The toning with chloroplatinite would, doubtless, tend to lessen this fatal objection.

**Poisoned Spears from the Mitchi Country.** F. Charteris. (*Pharm. Journ.* [4], **12**, 43.) Three poisoned stabbing spears,

used by the natives on the Upper Benne River, in the Niger territories, have been examined. The toxic principle is a glucoside which responds to all the reactions for strophanthin. The spears are therefore probably poisoned with strophanthin.

**Polishing Cream.** (*Pharm. Zeit.*, **47**, 212.) Methylated spirit, 400; strong solution of ammonia, 75; water, 150; petroleum ether, 80; kieselguhr, 80 to 100. Red or white bole, 50. Precipitated chalk, 100. Perfume with mirbane oil.

**Pomades, Stimulant, for the Hair.** (*Pharm. Zeit.*, **46**, 286.) (1) Precipitated sulphur, 5 to 10 parts; resorcin, 2.5 to 5; salicylic acid, 1.5 to 3; tincture of benzoin, 3; vaseline to make 100. (2) Lanoline, 40; sweet almond oil, 10; precipitated sulphur, 5; rose oil, q.s. to perfume. (3) Pilocarpine (hydrochloride?), 2; quinine hydrochloride, 4; precipitated sulphur, 10; Peruvian balsam, 20; beef marrow to 100.

**Porcelain Cement.** (*Bull. of Pharm.*, **15**, 527.) An almost invisible joint may be made, with careful handling, with the following:—Chloroform, 60 parts; india-rubber, 25; mastic, 15; Cut the rubber into shreds, put into a suitable vial, and pour on the chloroform. Stopper tightly, and set aside until the rubber is dissolved, then add the mastic, and let stand until same is dissolved. Apply the cement to each surface to be united, and let the pieces stand until the greater part of the chloroform is evaporated, then unite, press firmly to place, and if possible tie in position. When the cement is apparently thoroughly dry on the surface, scrape off the superfluity, and dust over the line of junction a little zinc oxide, chalk, powdered infusorial earth, or some such material, and with a clean pencil brush it over the joint. After the cement has become perfectly dry, remove the cords and rub off the superfluous powder. The joint can scarcely be discovered if the work has been well done.

**Rose Glycerin.** (*Pharm. Journ.* [4], **14**, 168.) Glycerin,  $\frac{1}{4}$  lb.; powdered boric acid,  $\frac{1}{4}$  oz.; rectified spirit,  $\frac{1}{4}$  fl. oz.; liquid cochineal, 1 fl. dr.; ess. bouquet, 2 fl. drs.; otto of roses, 1 mn.; water to 8 fl. ozs. Dissolve the acid in the water, add the liquid cochineal and glycerin, then add the spirit and perfumes, previously mixed. After shaking thoroughly, allow to stand for some days, then filter until perfectly bright.

**Rose Oil, Synthetic.** (*Phar. Centralh.*, **43**, 65, after *Chem. Zeit.*) In the light of recent researches, the following formula is given for the preparation of synthetic rose oil:—Geraniol, 80; citro-



nellol, 10; phenylethyl alcohol, 1; linalol, 2; citral, 0.25 and octyl aldehyde, 0.5 parts.

**Sewing Machine Oil.** (*Nat. Drugg.*, **31**, 343.) Either of the following make an excellent lubricant for sewing machines, and, in fact, of any kind of light machinery:—Rape-seed oil, 1 part; vaseline oil, 3. Heat the rape-seed oil to about 125°F., and mix the vaseline oil (the bland paraffin oil, known as “mineral glycerin,” answers admirably) intimately with it. Let stand for several days before filling off into small containers. Another formula is as follows:—Olive oil, 3 parts; paraffin oil, 1. Mix and heat, gently stirring until homogeneous. Let stand a few days and then decant off into small containers.

**Shoemakers' Polishing Ink.** (*Nat. Drugg.*, **31**, 380.) The *Neueste Erfindung. und Erfahr.* gives the following formula for a black ink or polishing liquid for shoemakers (applied to edges of sole, heels, etc.) Iron sulphate, water free, 600 parts; logwood extract, in fine powder, 80; potato starch, 80; black “Frankfurt,” 40; oxalic acid, in powder, 30; potassium chromate, yellow, powdered, 12; aniline black, water soluble, 12; Mix thoroughly. To produce the ink, dissolve 1 part of the powder in 10 parts of water.

**Silver, Paste for Cleaning.** (*Nat. Drugg.*, **31**, 347.) The following is said to be a very efficient cleaning paste for silver plate, etc.:—Tartaric acid, in powder, 3 parts; alum, in powder, 1; levigated chalk, 3; water, sufficient to make a paste. The paste is applied on a clean, soft rag and the article is rubbed with chamöis or woollen cloth.

**Skin Cream.** (*Pharm. Era*, **26**, 680.) The following formula, in which lanoline is employed, is claimed to produce an excellent preparation:—Boric acid, 3 grs.; tincture of benzoin, 4 drs.; glycerin, 6 drs.; rose water, 6 drs.; oil of rose, 2 mns.; lanolin, 12 drs. Mix.

**Solidified Ammonia.** (*L'Union Pharm.*, **43**, 70.) A German patent has been taken out for the production of ammonia in a concrete form. Sodium stearate, 3 to 5, is dissolved in 10 per cent. solution of ammonia, 10. This solution is added to 85 to 100 parts of solution of ammonia (30 per cent.), and the mixture agitated constantly at a temperature of 40°C. After a time the liquid sets to a solid paraffin-like mass. On exposure to the air and heat the ammonia is quickly volatilized, leaving a residue of sodium stearate which may be used again to solidify a fresh portion of ammonia.

**Staining White Blood Corpuscles.** R. C. Rosenberger. (*L'Union Pharm.*, **43**, 57). The blood is fixed by heat, or by alcohol, or a mixture of alcohol and ether, and then stained with the following stain for four minutes:—Saturated aqueous solution of methylene blue, 15 parts; saturated aqueous solution of phloxine, 2; distilled water, 6; alcohol (95 per cent.), 3. After washing, the preparation is dried and mounted in balsam. The phloxine is stated to render the leucocytes readily perceptible.

**Steel and Iron Parts of Machinery, to Keep Bright.** An excellent agent for preserving the brightness of articles, especially parts of machinery of iron or steel (says the *Zeitschrift f. d. ges. Kohlens. Ind.*), is a mixture in use in the laboratory of the Bavarian *Gewerbemuseum*, as follows:—Oil of turpentine, 5 parts; stearin oil, 25; jeweller's rouge, 25; animal charcoal, 45. Mix. When required for use, methylated spirit is added until it flows quite easily, and it is then applied with a pencil or brush to the parts to be cleaned. The alcohol soon evaporates, and with a powder made of 45 parts of animal charcoal, and 25 parts of rouge, the place is rubbed with a soft cloth. A few rubs leave the surface as brilliant as if just from a buffing wheel.

**Stramonium for Horse Flies.** (*Pharm. Journ.* [4], **12**, 253, after *Chasseur Illustré*.) A decoction of 1 part of stramonium leaves to 3 parts of water, boiled for twenty minutes and applied, when cool, to the face, about the ears, inside the legs, about the belly and croup, is sufficient to keep a horse free from its tormentors during a whole day. Stramonium is said to be much more efficacious when thus used than tobacco. [Practical experiments during the past two summers have confirmed the statement as to the efficacy of this treatment.—Ed. *Year-Book*.]

**Strontium and Ammonium Iodides, Preservation of.** Mansier. (*Journ. Pharm. Chim.* [6], **14**, 402.) Strontium iodide may be kept perfectly in an atmosphere containing CO<sub>2</sub> thus obtained. A layer of sodium bicarbonate is placed on the bottom of a stoppered bottle and covered thoroughly with a layer of cotton wool. The unstoppered bottle is then heated on the water bath and stoppered while hot. The strontium iodide is then introduced. Ammonium iodide is similarly preserved by placing ammonium carbonate covered with glass wool, on the bottom of the bottle in which it is kept.

**Styes, Applications for.** (*Practitioner*, **68**, 716.) (1) Boric acid, 1 part; distilled extract of witch hazel, 2; distilled water to make 32. To be applied on absorbent cotton several times

daily. (2) Corrosive sublimate,  $\frac{1}{6}$  gr.; petrolatum, 1 oz. Apply to the eyelids. (3) Sublimed sulphur, 45 grs.; ammonium chloride, 15 grs.; spirit of camphor, 90 mns.; rose water,  $1\frac{1}{2}$  fl. oz. (4) Mercuric oxide, yellow, 1 gr.; glycerin, a few drops; wool fat, 1 oz.

**Test Paper for Alkalis.** K. Dieterich. (*Pharm. Centralh.*, **42**, 521.) By applying a alcoholic solution of fluorescein and shellac to a neutral black paper, a test paper of extreme delicacy for ammonia and other alkalis is obtained. By its means ammonia in a dilution of 1:1,000,000 is readily detected.

**Thymol Formulæ in Dentistry.** F. A. Howarth. *Pharm. Journ.* [4], **12**, 368.) Glycerol of thymol, made in the strength of 1:24, is useful in treatment of pulp and alveolar abscess. A useful mouth-wash containing thymol may be made from: Thymol, gr. iii.; acid benzoic, gr. 45; tr. eucalypti,  $\text{ʒiv.}$ ; alcohol, ad  $\text{ʒiii.}$ ; ol. menth. pip.,  $\text{ʒxii.}$  One teaspoonful to a wineglassful of water. For those who smoke, or are troubled with fœtid breath, a few drops of the following, used on a soft tooth brush, will be found of great value: Thymol, gr. xii.; ol. eucalypti,  $\text{ʒxii.}$ ; ol. menth. pip.  $\text{ʒxii.}$ ; ol. limonis,  $\text{ʒxii.}$ ; chloroform,  $\text{ʒi.}$ ; glycerin,  $\text{ʒiss.}$ ; sp. rectificat, ad  $\text{ʒiii.}$  There are numerous proprietary articles sold under the fancy names of eugol, listerine, euthymol, etc., all containing thymol and boric acid, and being somewhat similar in composition.

**Toothache Cure.** (*Pharm. Journ.* [1], **14**, 446, after *Bull. of Pharm.*) Chloral hydrate, 1 oz.; camphor, 1 oz.; chloroform, 1 fl. oz.; ether, 1 fl. oz.; oil of cloves, 2 fl. ozs.; oil of peppermint, 2 fl. ozs.; alcohol, enough to make 16 fl. ozs. Put up in two drachm square vials.

**Tooth Pastes.** (*Oester. Zeits. für Pharm.*, **55**, 161.) Coca. Precipitated chalk, 90 Gm.; powdered soap, 30 Gm.; powdered cuttlefish, 15 Gm.; tincture of coca, 45 Gm.; solution of carmine, 3.75 Gm.; peppermint oil, 0.60 Gm.; ylang-ylang oil, 0.30 Gm.; glycerin, 30 Gm.; rose water, q.s. to mass.

**Eucalyptus.** Precipitated chalk, 150 Gm.; powdered soap, 45 Gm.; arrowroot, 45 Gm.; eucalyptus oil, 2 Gm.; peppermint, oil, 1 Gm.; geranium oil, 1 Gm.; clove oil, 0.25 Gm.; anise oil, 0.25 Gm.; glycerin, 45 Gm.; chloroform water, q.s. to mass; solution of carmine, q.s. to colour.

**Saponaceous.** Powdered pumice stone, 30 Gm.; powdered cuttlefish, 45 Gm.; powdered myrrh, 90 Gm.; powdered orris root, 105 Gm.; precipitated chalk, 180 Gm.; powdered soap, 240 Gm.;

glycerin, 360 Gm.; rose water, q.s. to mass; clove oil, 7.5 Gm.; rose oil, 3.75 Gm. Heat the soap with the glycerin on the water bath until a uniform mass is formed, then add a portion of the rose water, incorporate the powders, add more rose water, and, finally, the perfume.

**Tooth Wash, Saponaceous.** (*Bull. of Pharm.*, **15**, 527.) White Castile soap, 135 grs.; glycerin, 2 fl. drs.; simple syrup, 1 fl. oz.; water, 6½ fl. ozs.; alcohol, 6½ fl. ozs.; tincture of cardamoms, 1 fl. dr.; tincture Canada snake root (1 in 16), 1 fl. dr.; oil of peppermint, 15 drops; oil of winter-green, 15 drops; oil of cloves, 3 drops; oil of cassia, 3 drops; solution of carmine N F., sufficient to colour. Mix the soap, glycerin, syrup, and water, add the alcohol, then the remaining ingredients, let stand for a few days and filter at low temperature, so as to avoid subsequent separation of soap by reduction of temperature.

**Toothache Pellets.** (*Bull. of Pharm.* **15**, 527.) (1) Spermaceti, 2 parts; chloral hydrate, 2; carbolic acid, 1; cotton, sufficient. Melt the spermaceti, dissolve in it the chloral and carbolic acid, then saturate cotton with the warm mixture, and let it cool. (2) Paraffin, 50 parts; carbolic acid, 1. (3) Paraffin, 6 parts; burgundy pitch, 7; oil of celery, 2; creosote, 2. Melt the solids together, and when nearly cool add the liquids. Divide into pieces of suitable size. (4) Powdered opium, 15 grs.; powdered belladonna root, 15 grs.; powdered pyrethrum, 15 grs.; oil of cloves, 3 drops; oil of cajuput, 3 drops; Expressed oil of almonds, 8 drops; wax, 20 grs. Make into a mass by the aid of heat and divide into pellets. (5) Oil of cloves, 1 part; oil of cassia, 1; black pepper, 4; sodium chloride, 4; powdered acacia, 4. (6) Salol, 2 parts; liquid paraffin, 2; Venice turpentine, 2; wax, 13. Triturate the salol, oil and turpentine together, and add the melted wax, which may be coloured with alkannin if desired.

**Typewriter Copying Ink.** (*Amer. Drugg.*, **40**, 120.) Transparent soap, 1 oz.; glycerin, 4 fl. ozs.; water, 12 fl. ozs.; alcohol, 24 fl. oz.; aniline dye, a sufficient quantity. Dissolve the soap in the water and glycerin with the aid of heat; dissolve the aniline dye of any desired shade in the alcohol and mix the two solutions. If the ink is too soft add more soap.

**Vanillin, Formation of in the Vanilla Pod.** H. Lecomte. (*Comptes rend.*, **133**, 745.) It is found that all parts of the vanilla plant contain an oxydase, which is most plentiful in the fruit in the parenchyma of the pericarp in the neighbourhood of the fibrovascular bundles. Another ferment, which has powerful

reducing properties, is also present in the fruit which converts the coniferin present into coniferylic alcohol and glucose; the former is then oxidized, by the oxydase, into vanillin.

**Vanillin, Synthetic, and Vanilla.** P. Carles. (*Répertoire de Pharm.* [3], 14, 5.) The author considers that, although synthetic vanillin may reproduce the odour of vanilla, it has not by any means the same delicacy of flavour; for flavouring chocolate and similar confectionery it is stated not to possess the same softness of flavour. It is, in fact, considered to hold a position similar, as far as flavour is concerned, to that of commercial spirit compared with true wine spirit; the taste of the former is harsh and fugitive, while that of the latter is mellow and lasting.

**Zinc, Arsenic free, Preparation of.** O. Hehner. (*Journ. Soc. Chem. Ind.*, 21, 676.) Melt a pound or two of ordinary block zinc in a clay crucible over a good gas fire. When quite fluid, throw in, at intervals, pieces of sodium, about 15 grs. for each pound of metal, and stir vigorously. A black scum forms, which is skimmed off from time to time with a china spoon or a crucible lid. When all the sodium appears to have oxidized out, add another piece of sodium, stirring as before. Transfer the molten metal to another clean clay crucible, and repeat the treatment with sodium as before. Allow the metal to cool somewhat before granulating, pouring it into the water when near its solidifying point. In this way thin flakes of metal will be obtained. The molten metal must on no account be stirred with an iron rod, since all commercial iron is arsenical.



TRANSACTIONS  
OF THE  
British Pharmaceutical Conference  
AT THE  
THIRTY-NINTH ANNUAL MEETING  
IN  
DUNDEE,  
1902.

## C O N T E N T S

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# British Pharmaceutical Conference.

## CONSTITUTION

**Art I**—This Association shall be called The British Pharmaceutical Conference, and its objects shall be the following —

- 1 To hold an annual Conference of those engaged in the practice, or interested in the advancement, of Pharmacy, with the view of promoting their friendly reunion, and increasing their facilities for the cultivation of Pharmaceutical Science
- 2 To determine what questions in Pharmaceutical Science require investigation, and when practicable, to allot them to individuals or committees to report thereon
- 3 To maintain uncompromisingly the principle of purity in Medicine
- 4 To form a bond of union amongst the various associations established for the advancement of Pharmacy, by receiving from them delegates to the annual Conference

**Art II**—Membership in the Conference shall not be considered as conferring any guarantee of professional competency

## RULES

1 Any person desiring to become a member of the Conference shall be nominated in writing by a member, and be balloted for at a general meeting of the members two thirds of the votes given being needful for his election. If the application be made during the recess, the Executive Committee may elect the candidate by a unanimous vote.

2 The subscription shall be 7s. 6d. annually, which shall be due in advance upon July 1.

3 Any member whose subscription shall be more than two years in arrear, after written application, shall be liable to be removed from the list by the Executive Committee. Members may be expelled for improper conduct by a majority of three fourths of those voting at a general meeting provided that fourteen days' notice of such intention of expulsion has been sent by the Secretaries to each member of the Conference.

4 Every association established for the advancement of Pharmacy shall during its recognition by the Conference, be entitled to send delegates to the annual meeting.

5 The Officers of the Conference shall be a President, a number of Vice presidents not exceeding six, by election, the past Presidents (who shall be Vice presidents) a Treasurer, two General Secretaries, one local Secretary and nine other members, who shall collectively constitute the Executive Committee. Three members of the Executive Committee to retire annually by ballot the remainder being eligible for re-election. They shall be elected at each annual meeting by ballot of those present.

6 At each Conference it shall be determined at what place and time to hold that of the next year.

7 Two members shall be elected by the Conference to audit the Treasurer's accounts, such audited accounts to be presented annually.

8 The Executive Committee shall present a report of proceedings annually.

9 These rules shall not be altered except at an annual meeting of the members.

10 Reports on subjects entrusted to individuals or committees for investigation shall be presented to a future meeting of the Conference, whose property they shall become. All reports shall be presented to the Executive Committee at least fourteen days before the annual meeting.

\* \* \* *Authors are specially requested to send the titles of their Papers to The Hon. Gen. Secs. Brit. Pharm. Conf., 17, Bloomsbury Square London, W.C., six or three weeks before the Annual Meeting. The subjects will then be intensively advertised, and thus full interest will be secured.*

## FORM OF NOMINATION

### I Nominate

(Name)

Address)

as a Member of the British Pharmaceutical Conference.

Member

Date

This or any similar form must be filled up legibly, and forwarded to *The Asst. Secretary Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C.*, who will obtain the necessary signature to the paper.

Pupils and Assistants, as well as Principals, are invited to become members.

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 White, E , B Sc , F I C , St Thomas's Hospital, London, S W  
 White, G , 55, High Street, Dudley  
 White, Jas W , F L S , Warnham, Woodland Road, Clifton, Bristol  
 White, Thomas, 16, Fownes Street, Dublin  
 Whitfield, J , I C S , 113, Westborough, Scarborough  
 Whittle, J , 30, Bridge Street, Morpeth  
 Whyte, J S , 57, Guthrie Port, Arbroath, N B  
 Wiggins, H , 236, Southwark Park Road, S E  
 Wigginton, A , 137, Sloane Street, S W  
 Wild, John, 307, Oxford Street, Manchester  
 Wild, Sydney, 76, Mill Street, Macclesfield  
 Wilford, J , 52, Milton Street, Nottingham  
 Wilkinson, B J , 7 Middleton Road, King'sland, N E  
 Willcock, F A , 71, Victoria Street, Wolverhampton  
 Will, W Watson, F C S , 1, St Agnes Place Kennington Park, S E  
 Willan, R , 5, Market Street, Ulverston  
 Williams, Jesse, Park Hall Buildings, Queen Street, Cardiff  
 Williams, J H , 35, Commercial Road, Bournemouth  
 Williams, I R , Norton House, St John's Road Penge, S E  
 Williams, W G , 9, Castle Street, Conway  
 Williamson, F A , Moor Park Pharmacy Preston Lancs  
 Williamson, L , 12, Haldane Terrace, West Jesmond, Newcastle on Tyne  
 Williamson, W H , 54, Dantzic Street Manchester  
 Wills, G S V , Westminster College, Trinity Square, Boito', S E  
 Wilson, H , F I C , 146, High Street, Southampton  
 Wilson, Harold, University College Hospital, Gower Street, W C  
 Wilson, J , 11, George Street, Bath  
 Wilson, J H , J.P , The Knowle, Harrogate  
 Wing, G N , 29, Market Place, Melton Mowbray  
 Wink, J A., 2, Devonshire Square, Bishopsgate Street, E C  
 Wokes, T S , Grassendale, near Liverpool  
 Wood, A , New Brentford, Middlesex  
 Wood, Wm , 2, Tower Road, Dartford, Kent  
 Wooddisse, Frank B , Kenilworth.  
 Woodhead, S A , The College, Uckfield, Sussex  
 Woods, W H , 50, Bedford Street, Plymouth  
 Woodward, M Mellor, 53, London Road, Reigate  
 Woolcombe, Dr Robert Lloyd, M A , LL D (Dublin Univ ), LL D (Royal Univ ), F I Inst , F S S , M R I A , F R S A (Ireland)  
 Medical Student (T C D ), Barrister at Law, 14, Waterloo Road, Dublin  
 Woolley, E J , Victoria Bridge, Manchester  
 Woolley, G S , Victoria Bridge, Manchester  
 Woolley, Hermann, Victoria Bridge, Manchester  
 Woolley, S W , 91, Southwood Lane, Highgate, N.  
 Woollons, C H F , 28, Kilburn Lane, W.

Wootton, A. C., Barrymore, Fallow Corner, North Finchley, N.  
 Wootton, H., B.Sc., 323, Clapham Road, S.W.  
 Worfolk, G. W., 16, Brook Street, Ilkley.  
 Worrall, J. H., F.I.C., F.C.S., Howsley, Chapeltown, nr. Sheffield.  
 Worsley, A. G., 135, Ladbroke Grove, W.  
 Wrenn, W. A., F.C.S., 15, East Street, Taunton.  
 Wright, A., A.K.C., 13, High Street, Yeovil, Somerset.  
 Wright, G., 102, High Street, Burton-on-Trent.  
 Wright, H. C., 48 & 50, Southwark Street, S.E.  
 Wright, R., F.C.S., 11, Eagle Parade, Buxton, Derbyshire.  
 Wyatt, H., 223, Stanley Road, Bootle, Liverpool.  
 Wyborn, J. M., F.C.S., 59, Moorgate Street, E.C.  
 Wyley, W. F., Wheatley Street, Coventry.  
 Wyman, J. S., 58, Bunhill Row, E.C.  
 Wynne, E. P., 7, Pier Street, Aberystwith.

Yates, C. G., 9, Upper Hamilton Road, Brighton.  
 Yates, D., 32, Darwen Street, Blackburn.  
 Yates, F., "Aysgark," Avenue Elners, Surbiton.  
 Yates, R., "Gatewick," The Avenue, Beckenham, Kent.  
 Young, E. F., 67, Wells Road, Bristol.  
 Young, J. Rymer, F.C.S., 40, Sankey Street, Warrington.  
 Young, J. R., 38, Chalmers Street, Lauriston, Edinburgh.  
 Young, J. R., 2, Grange Road, Edinburgh.  
 Young, R. F., Lindum House, New Barnet.

## NOTICE.

*Members are requested to report any inaccuracies in these lists by letter, addressed as follows :—*

THE ASST. SECRETARY,

BRIT. PHARM. CONF.,

17, Bloomsbury Square,

London, W.C.

## SOCIETIES AND ASSOCIATIONS

INVITED TO SEND DELEGATES TO THE ANNUAL MEETING.

The Pharmaceutical Society of Great Britain

The North British Branch of the Pharmaceutical Society of Great Britain

The Pharmaceutical Society of Ireland

**ABERDEEN** —Pharmaceutical Association    John Cruickshank, 42, George Street, Aberdeen

**BELFAST** —Chemists and Druggists' Society of Ireland (North Branch)    W. J. Rankin, 10, Garfield Chambers, Belfast

**BIRMINGHAM** —Midland Pharmaceutical Association    G. H. Biant, 323, Coventry Road, Birmingham

**BOURNEMOUTH** —Pharmaceutical Association    T. E. Bilson, 1, Lansdowne Crescent, Bournemouth

**BRIGHTON** —Association of Pharmacy (1861)    W. W. Savage, 109, St James's Street, Brighton

**BRISTOL** —Pharmaceutical Association (re established 1869)    H. E. Booine, 23, Redcliffe Street, Bristol

**CAMBRIDGE** —Pharmaceutical Association    B. S. Campkin, Mill Road, Cambridge.

**COLCHESTER** —Association of Chemists and Druggists (1845).    Edes Everett St Botolph Pharmacy, Colchester

**DOVER** —Chemists' Association    R. M. Ewell, 37, Town Wall Street, Dover

**EDINBURGH** —Chemists' Assistants and Apprentices' Association    Peter K. Brown, 64, Tolbooth Wynd, Leith

**FORFARSHIRE AND DISTRICT** —Chemists' Association    Wm. Cummings, 49, Reform Street, Dundee

**GLASGOW AND WEST OF SCOTLAND** —Pharmaceutical Association    D. Watson, 558, Cathcart Road, Glasgow

**GRIMSBY AND DISTRICT** —Chemists and Druggists' Association    H. W. Colley, 253, Cleethorpe Road, Grimsby

**HULL** —Chemists' Association (1868)    C. B. Bell, 6, Spring Bank, Hull

**LANCASHIRE (NORTH EAST)** —Chemists' Association.    G. B. Pickworth, 72, Victoria Street, Blackburn

**LEEDS** —Chemists' Association (1862)    W. D. Pollitt, Church Institute, or 106, Woodhouse Lane, Leeds

**LIVERPOOL** —Chemists' Association (1849)    Theo. H. Waidleworth, 56, Hanover Street, and Hugh O. Dutton, Rockferry, Liverpool

**LONDON.**—Chemists' Assistants' Association. R. E. Lownsbrough, 73, Newman Street, W. Western Chemists' Association. W. J. J. Philp, 34, High Street, Notting Hill, W.

**MANCHESTER.**—Pharmaceutical Association. Jas. C. Kidd, 551, Cheetham Hill Road, Manchester.

**NEWCASTLE-ON-TYNE.**—Newcastle-on-Tyne and District Chemists' Association. W. Atkins, 126, Raby Street, So. Byker, Newcastle-on-Tyne.

**NOTTINGHAM.**—Nottingham and Notts Chemists' Association (1863). A. Eberlin, 2, Chapel Bar, Nottingham.

**OXFORD AND DISTRICT.**—Chemists' Association. John Dolbear, 108, High Street, Oxford.

**PLYMOUTH, DEVONPORT, STONEHOUSE AND DISTRICT.**—Chemists' Association. G. Fairweather, 11, Laird Terrace, Plymouth.

**SHEFFIELD.**—Pharmaceutical and Chemical Society (1869). H. Antcliffe, Union Offices, Sheffield.

**SUNDERLAND.**—Chemists' Association (1869). A. W. Golightly, 14, Hendon Valley Road, Sunderland.

**SWANSEA**—Swansea and District Chemists' Association. John Davies, 75, Oxford Street, Swansea.

PRESNTATION COPIES OF THE YEAR-BOOK OF PHARMACY ARE  
FORWARDED TO THE FOLLOWING.—

### *The Honorary Members.*

#### **Libraries.**

American Pharmaceutical Association, Chemical Society of London, École Supérieure de Pharmacie, Montpellier, École Supérieure de Pharmacie, Paris, The Mason College, Birmingham, New Zealand Board of Pharmacy, North British Branch of the Pharmaceutical Society, Pharmaceutical Society of Great Britain, Pharmaceutical Society of Ireland, Pharmaceutical Society of New South Wales, Ontario College of Pharmacy, Toronto, Pharmaceutical Society of Australasia, Pharmaceutical Society of Queensland, Philadelphia College of Pharmacy, Royal Society of London, Societe de Pharmacie, Paris, Yorkshire College of Science, Leeds, Owens College, Manchester, The Pharmaceutical Society of Cape Colony.

#### **Provincial Associations (having Libraries).**

Bristol Pharmaceutical Association, Dover Chemists' Association, Dorsetshire and District Chemists' Association, Glasgow and West of Scotland Pharmaceutical Association, Grimsby and District Chemists' and Druggists' Association, Leeds Chemists' Association, Liverpool Chemists' Association, London Chemists' Assistants' Association, Manchester Chemists and Druggists Association, Midland Pharmaceutical Association Nottingham and Notts Chemists' Association, Sheffield Pharmaceutical and Chemical Association, Sunderland Chemists' Association

#### **Journals.**

American Journal of Pharmacy, Archiv der Pharmazie, Canadian Pharmaceutical Journal, Chemical News, Chemist and Druggist, Journal de Pharmacie et de Chimie, Medical Press and Circular, Pharmaceutical Journal, Répertoire de Pharmacie, Pharmaceutisch Weekblad (Amsterdam)

THE FOLLOWING PUBLICATIONS ARE RECEIVED FROM THEIR RESPECTIVE EDITORS —

American Journal of Pharmacy, Annales de Chimie Analytique, Archiv der Pharmazie, Australasian Journal of Pharmacy, Canadian Pharmaceutical Journal, Chemical News, Chemist and Druggist, Journal de Pharmacie et de Chimie, Meyer Bros' Druggist, Medical Press and Circular, National Druggist, Pharmaceutical Journal, Proceedings of the American Pharmaceutical Association, Répertoire de Pharmacie, L'Union Pharmaceutique, Zeitschrift des allgem oesterreich Apotheker Vereines, Pharmaceutisch Weekblad (Amsterdam)

# PROGRAMME OF THE PROCEEDINGS

## OF THE

# BRITISH PHARMACEUTICAL CONFERENCE

### AT THE

## THIRTY-NINTH ANNUAL MEETING, DUNDEE, 1902.

### OFFICERS.

**President.** G. C. DRUCE, M.A., F.R.S., Oxford.

#### Vice-Presidents.

(Who have filled the office of President)

**PROFESSOR ATTFIELD**, Ph.D., F.R.S., Watford.  
**S. R. ATKINS**, J.P., Salisbury.  
**F. B. BENGER**, F.R.C.S., Manchester  
**G. UMNEY**, F.R.C.S., London

**CLAUVIUS CORDER**, Norwich.  
**N. H. MARTIN**, F.R.S., Newcastle-on-Tyne.  
**C. SYMES**, Ph.D., F.R.C.S., Liverpool.  
**J. C. C. PAYNE**, J.P., M.P.S.I., Belfast.  
**E. M. HOLMES**, F.R.S., London.

#### Vice-Presidents.

**G. T. W. NEWSHOLME**, F.R.S., Sheffield.  
**G. D. BEGGS**, M.P.S.I., Dalkey.

**CHAS. KERR**, Dundee  
**W. A. H. NAYLOR**, F.R.C.S., London.

**Treasurer.** JOHN C. UMNEY, F.R.S., London.

#### Honorary General Secretaries.

**F. RANSOM**, F.R.S., Hitchin.

**E. SAVILLE PECK**, M.A., Cambridge

#### Honorary Local Secretary.

**W. CUMMINGS**, Dundee.

#### Assistant Secretary.

**JOHN HEARN.**

#### Other Members of the Executive Committee.

**ATKINSON**, Leo., London.

**BERNARD**, J. I., Dublin

**COLLIER**, H., London.

**FLAR**, E. H., F.R.C.S., Uckfield.

**GREENISH**, Prof., F.R.C., F.R.S., London.

**NATSMITH**, ANDREW, Arbroath.

**TYRRE**, C. T., London.

**WELLS**, W. F., Dublin.

**WHITE**, EDMUND, B.Sc., London

#### Auditors.

**G. H. GRINDLEY**, Dublin, and **JAMES RUSSELL**, Dundee.

**Editor of the Year-Book.** J. O. BRAITHWAITE

#### Dundee Local Committee.

**ABEL**, R. Forfar  
**\*ANDERSON**, A. B. Dundee  
**ANDERSON**, JAMES Dundee  
**\*ANDERSON**, JOHN Dundee  
**ANDERSON**, W. St Andrews  
**AYER**, G. M., Perth  
**BENNETT**, F. W. M., Arbroath  
**BLAIR**, R. P. Perth  
**BRUCE**, G. Cupar Fife  
**BRUNTON**, W. D. Perth  
**BUTCHAN**, D. Arbroath  
**BUCHANAN**, D. Kirriemuir  
**BURN**, D. H. Arbroath  
**CUMMINGS**, C. Dundee  
**\*CUMMINGS**, W. Dundee  
**\*DAVIDSON**, A. Montrose  
**\*DOUG**, W. Dundee  
**DOUG**, J. L. Dundee  
**DONAGHY**, J. J. Dundee  
**DONALD**, T., Perth

**FARQUHAR**, I. Perth  
**FERGUSON**, I. Perth  
**\*FERRIER**, D. H. Dundee  
**FERRIER**, J. Dundee  
**\*FERRIER**, W. Brechin  
**FERNING**, K. Broughty Ferry  
**\*FORD**, J. Kirriemuir  
**GORDON**, J. Dundee  
**FOWLER**, G. R. Forfar  
**GILLES**, A. Perth  
**\*GRAY**, J. Dundee  
**\*GRIFIO**, J. Dundee  
**HARDIE**, J. Dundee  
**\*HARDIE**, J. M. Dundee  
**\*HARRIS**, G. Perth (Ed)  
**HENDERSON**, D. J. Cairnmuir  
**\*HODGE**, J. Dundee  
**HUGHES**, D. Brechin  
**HUTTON**, J. Brechin  
**\*JACK**, J. Arbroath

**JOHNSON**, I. Forfar  
**KAYE**, A. Perth  
**\*KELMATH**, W. R. St Andrews  
**\*KERR**, C. Dundee  
**KIRK**, J. I. St Andrews  
**LAHONT**, W. Brechin  
**LAWSON**, A. Dundee  
**LINDSAY**, R. Dundee  
**M. KINNON**, D. Dundee  
**\*MACFARLAN**, M. Forfar  
**MACON**, A. B. Dundee  
**MILAR**, J. H. Broughty Ferry  
**\*NATSMITH**, A. Arbroath  
**\*PARK**, W. Broughty Ferry  
**PERKINS**, T. Lochee  
**RABBIT**, W. C. Dundee  
**RANKIN**, A. T. Dundee  
**ROBERTSON**, J. Arbroath  
**ROBERTSON**, J. W. Dundee

**ROBERTSON**, W. G. Cupar Fife  
**ROSS**, A. L. Montrose  
**\*RUSSELL**, JAMES Dundee  
**\*RUSSELL**, J. W. Dundee  
**RUXTON**, J. Arbroath  
**SMITH**, J. Perth  
**SMITH**, R. Dundee  
**STRACHAN**, R. G. Dundee  
**STRANG**, P. Perth  
**TAYLOR**, J. R. Dundee  
**THOMSON**, J. Dundee  
**\*THOMSON**, J. H. Lochee  
**TROUP**, A. S. Montfeth  
**WALKER**, W. Downfield  
**WHITELAW**, A. Cupar Fife  
**WHYTE**, J. Arbroath  
**WHITIE**, H. P. Montrose  
**WILLIAMSON**, I. Dundee  
**WOOD**, D. M. Dundee  
**YOUNG**, C. Dundee

*Those marked with an asterisk were on the Local Executive*

THE SITTINGS OF THE CONFERENCE WERE HELD IN  
**THE CHEMISTRY LECTURE HALL OF UNIVERSITY COLLEGE, DUNDEE,**  
 ON TUESDAY & WEDNESDAY, AUGUST 12 AND 13, 1902,  
 Commencing at Ten a.m. each day.

**MONDAY, AUGUST 11.**

The EXECUTIVE COMMITTEE met, according to notice from the Honorary General Secretaries, at the Victoria Art Galleries

**TUESDAY, AUGUST 12.**

The CONFERENCE met at 10 a.m., adjourning at 1 p.m., and at 2 p.m., adjourning at 4 p.m.

**Order of Business.**

Address of Welcome by the Principal of University College, Dundee

President's Address

Reception of Delegates

Report of Executive Committee

Financial Statement

Report of Treasurer of the "Bell and Hills" Library Fund

Report of Formulary Committee, by N. H. MARTIN, F.L.S., F.C.S.

Reading of Papers and Discussions thereon

**PAPERS.**

- 1 *Alkaloidal Stability of certain Standardized Preparations of the Pharmacopœia*, by W. A. H. NAYLOR, F.I.C., F.C.S., and C. HUNTHAM
- 2 *The Standardized Tinctures and Ipecacuanha Wine of the British Pharmacopœia. A Report on the Strength of Commercial Standards*, by E. H. FARR, F.C.S., and R. WRIGHT, F.C.S., PHARMACISTS
- 3 *A Note on Aromatic Sulphuric Acid*, by LIONARD DOBBIN, Ph.D.
- 4 *Chinese Oil of Neroli*, by JOHN C. UMNIFY, F.C.S., and C. T. BENNETT
- 5 *Olive Oil, Commercial Varieties and the Pharmacopœia Tests*, by JOHN C. UMNIFY, F.C.S., and C. T. BENNETT
- 6 *Note on Cannabis Indica*, by THOMAS MABER, F.C.S.
- 7 *Cannabis Indica—a Demonstration*, by PROFESSOR C. R. MARSHALL
- 8 *The Oxidation and Determination of Uric Acid and Nitrates*, by J. F. TOCHER, F.I.C., F.C.S.
- 9 *Aseptic Surgical Shaving Paste*, by EDMUND WHITE, B.Sc., F.I.C.
- 10 *A General Method for Dispensing Compressed Tablets*, by EDMUND WHITE, B.Sc., F.I.C., and R. A. ROBINSON, JUNR
- 11 *Liquor Thyroides*, by EDMUND WHITE, B.Sc., F.I.C.
- 12 *On Tasteless Cascara Preparations*, by EDMUND WHITE, B.Sc., F.I.C. and R. A. ROBINSON, JUNR

There was a mid day adjournment between 1 and 2 p.m. for luncheon at the Queen's Hotel.



**WEDNESDAY, AUGUST 13**

The CONFERENCE met at 10 a.m., adjourning from 1 to 2 p.m. The whole of the business was completed at about 4.30 p.m.

**Order of Business.**

Reading of Papers and Discussions thereon

**PAPERS**

- 13 *The Education of Pharmacists*, by PROFESSOR C. R. MARSHALL, M.D.
- 14 *The Toxic Principles of the Conium*, by PROFESSOR C. R. MARSHALL, M.D.
- 15 *Some Examples of Galenical Preparations made on the Retail Scale*, by JOHN H. THOMSON
- 16 *Official Recognition of Anti Diphtheria Serum*, by THOMAS MABEN, F.C.S.
- 17 *Notes on Liquor Krameria Comp.*, by F. C. J. BIRD
- 18 *New Apparatus for Milk Analysis*, by G. D. MACDOUGALD, F.I.C.
- 19 *Bismuth Salts in Mixtures*, by EDMUND WHITE, B.Sc.
- 20 *Bismuth Citrate and Liquor Bismuthi*, by WILLIAM DUNNAN, Ph.C. F.C.S.
- 21 *Variations in the Occurrence of Salicin and Salinigrin in different Willow and Poplar Barks*, by H. A. D. JOWETT, D.Sc., and C. E. POITIER
- 22 *Solanum Dulcamara*, by FREDERICK DAVIS
- 23 *Decinormal and Centinormal Solutions, the limits of their Reliability*, by R. C. COWLEY and J. P. CALFORD
- 24 *Pharmacy Notes*, by R. WRIGHT, F.C.S., Ph.C.
  - (1) An improved form for Liquor Biomo Chloroal Compositus
  - (2) Camphorated Oil
  - (3) Alcoholic Extracts
- 25 *The Volumetric Estimation of Lead Salts*, by R. C. COWLEY and J. P. CALFORD
- 26 *The Volumetric Determination of Sodium Phosphate and Arsenate*, by F. R. DUFFERIDGE, F.C.S., and J. S. HILL

Presentation to W. A. H. Naylor, F.I.C., F.C.S., late Hon. Secretary.

Presentation from the "Bell and Hills" Fund.

Election of Formulary Committee.

Place of Meeting for 1903.

Election of Officers for 1902-1903.

There was a mid-day adjournment between 1 and 2 p.m. for luncheon at the Queen's Hotel.

**THURSDAY, AUGUST 14.**

Excursion to Comrie and St. Fillans. For particulars see page 516.

## BRITISH PHARMACEUTICAL CONFERENCE.

### MEETING IN DUNDEE, 1902.

THE Thirty-ninth Annual Meeting of the British Pharmaceutical Conference commenced its sittings on Tuesday, August 11, in the Chemistry Lecture Hall of University College, and after luncheon continued and completed its sittings in the same Hall, under the chairmanship of George Claridge Druce, Esq., M.A., F.L.S., Oxford.

*The following members and friends were present during the meeting :—*

*Aberdeen*—Giles, Wm. ; Paterson, Jas. ; Weir, A. S.

*Alloa*—Cummings, Mr. and Mrs. John.

*Arbroath*—Jack, Mr. and Mrs. James ; Naysmith, Mr. and Mrs. A.

*Bath*—Collis, A. F.

*Bedlington*—Foggan, G.

*Belfast*—Gibson, Mr. W. J., and Miss ; Nicholl, Isaac W. ; Payne, Mr. and Mrs. J. C. C.

*Blackburn*—Gifford, R. Lord.

*Bonnyrigg*—Hutcheon, W.

*Bradford*—Hanson, Mr. and Mrs. A. ; Jackson, Mr. J., Mrs. and Miss ; Silson, Mr. and Mrs. R. W.

*Brighton*—Savage, W. W. ; Yates, C. G.

*Bristol*—Boorne, H. E. ; Young, E. F.

*Broughty Ferry*—Fleming, E. ; Park, Mr. W., Mrs. and Miss.

*Cambridge*—Peck, E. Saville ; Peck, Miss Lilian, C.

*Clifton, Bristol*—Turner, G. T. ; White, Mr. and Mrs. J. W.

*Darwen*—Shorrock, R.

*Denny*—Forbes, John J.

*Derby*—Haddock, J.

*Dover*—Ewell, R. M.

*Dowlais*—Rees, R. P.

*Dublin*—Wells, Mr. and Mrs. W. F.

*Dundee*—Anderson, Mr. and Mrs. A. B.; Anderson, John; Anderson, Marshall; Cummings, C.; Cummings, W.; Doig, John, L.; Doig, Mr. and Mrs. William; Fernie, J. P.; Ferrier, D. H.; Forsyth, J.; Gray, Mr. and Mrs. John; Greig, Mr. and Mrs. John; Hardie, Mr. and Mrs. J. Miller; Hodge, John; Kerr, Mr. C., Mrs. and the Misses; Macdougald, G. D.; Malloch, J.; Manny, Chas.; Milne, J. C.; Peebles, T. E.; Robertson, J. W.; Russell, James; Russell, Mr. and Mrs. J. W.; Taylor, J. Russell; Thomson, Mr. and Mrs. J. H.; Walker, W.; Young, Charles.

*Edinburgh*—Bayne, T.; Beaumont, W. L.; Boa, Peter; Care, Mr. and Mrs. H. Bristowe; Coull, Dr. and Mrs. George; Cowie, W. B.; Dey, A. J.; Dobbin, Dr. Leonard; Dott, D. B.; Gibson, Mr. Adam and Miss; Harkness, John; Henry, Mr. and Mrs. Claude F.; Hill, J. Rutherford; Kelly, Albert E.; Mackenzie, James; Mair, Mr. and Mrs. W.; Thomson, J. W.

*Forfar*—Macfarlane, M.

*Glasgow*—Barrie, T. S.; Brodie, R.; Gilmour, J. P.; Hustler, W.; Maben, Thos.

*Gravesend*—Clarke, R. Feaver.

*Hitchin*—Ashton, F. W.; Ransom, Mr. and Mrs. F.

*Helensburg*—McMurray, P. B.

*Inverness*—Allan, Alexander; Mackenzie, Thomas; Mitchell, D.

*Kirkcaldy*—Storror, Mr. D. and Miss.

*Kirriemuir*—Buchanan, D.; Ford, James.

*Leicester*—Todd, R.

*Liverpool*—Evans, Edward, Jun.; Marsden, Prosper H.; Wardleworth, Theo. H.

*London*—Ball, A. W.; Bird, F. C. J.; Bowen, John W.; Bremridge, Richard; Chalmers, Mr. and Mrs. W.; Clarke, C. Goddard; Craig, A.; Fennemore, H.; Garsed, W.; Hearn, J.; Howie, W. L.; Idris, T. H. W.; MacEwan, Mr. and Mrs. Peter; Naylor, W. A. H.; Paul, B. H.; Parsons, W.; Robinson, W. Prior; Tanner, A. E.; Tyrer, T.; Umney, Mr. and Mrs. J. C.; Want, W. P.; Watson-Will, W.; White, E.

*Manchester*—Grier, James; Johnstone, C. A.; Pidd, Mr. A. J. and Miss M. E.; Smith, Mr. J. T. and Miss.

*Montrose*—Davidson, A.; Foreman, J.

*New Barnet*—Young, R. Fisher.

*Newcastle-on-Tyne*—Clark, John; Martin, Mr. N. H., Mrs. and Miss; Merson, Mr. and Mrs. G. F.; Sharp, Mr. and Mrs. W.; Taylor, Mr. and Mrs. J. H.

*Oxford*—Druce, G. Claridge; Leach, T. H. de Blois.

*Paisley*—Cummings, Miss; Frazer, Mr. and Mrs. A.

*Peebles*—Lindsay, Mr. and Mrs. R.

*Perth*—Harley, Mr. and Mrs. A. T.

*Peterhead*—Tocher, Mr. and Mrs. J. F.

*Rhynie*—Troup, W.

*St. Andrew's*—Govan, Alex.; Kermath, W. R.; Marshall, Prof. C. R.

*Salisbury*—Atkins, S. R.

*Sheffield*—Newsholme, Mr. G. T. W., Mrs. and Miss.

*Shipley*—Bayley, Mr. and Mrs. G. H.

*Stirling*—Jackson, Mr. J. E., Mrs. and Miss.

*Weybridge*—Kennett, J. Nash.

*Wimbledon*—Gerrard, A. W.

*Worcester*—Twinberrow, J.

#### MEETING OF THE EXECUTIVE COMMITTEE.

A meeting of the Executive Committee was held in the Victoria Art Gallery on Monday, August 11, at 9.45 p.m.

. Present:—Mr. G. Claridge Druce (President), in the chair, Messrs. Atkins, Martin, Naylor, Newsholme, and Payne (Vice-Presidents), Mr. J. C. Umney (Hon. Treasurer), Messrs. Cummings, Kerr, W. F. Wells, and White, Messrs. Ransom and Peck (Hon. Gen. Secretaries), and Mr. J. Hearn (Assist. Secretary).

The minutes of the last meeting were read and confirmed.

The following resolution, having been moved and seconded, was unanimously adopted—

“That the Executive Committee records with deep regret the loss to the Conference caused by the death of Thomas B. Groves, of Weymouth, its Senior Past-President. The Secretaries are instructed to write, expressing the sympathy of the Executive with his relatives, and its deep appreciation of the valuable papers contributed by Mr. Groves to the Conference since the earliest days of its existence, and the keen interest which he has always shown in its welfare.”

The Draft Annual Report of the Executive Committee was then read and discussed. Mr. S. R. Atkins proposed, and Mr. White seconded its adoption, which was then carried.

Mr. J. C. Umney read the Financial Statement for the year.

Mr. W. F. Wells suggested that for greater convenience two

Auditors residing in London be appointed. After some discussion this was also decided upon.

The order of the reading of papers was then considered, Mr. Payne suggesting that the papers of those members who were present should have precedence. It was decided to leave it in the Secretaries' hands.

The question of the number of Vice-Presidents was considered. It was decided to recommend that Rule V. should be amended as follows: for the words "four Vice-Presidents by election" read "Vice-Presidents by election, not exceeding six."

The list of officers proposed for the ensuing year was decided upon.

The Secretary stated that Mr. Tocher had very kindly placed at the disposal of the Executive the manuscript of a General Index of the Proceedings of the Conference. The Secretaries were instructed to thank Mr. Tocher very heartily, and to consider the cost and expediency of publishing it.

A large number of gentlemen were proposed for membership and duly elected.

## GENERAL MEETING.

*Tuesday, April 12.*

The Thirty-ninth Annual Meeting of the Conference commenced its sittings on Tuesday, August 13, in the Chemistry Lecture Hall of University College, the use of which had kindly been granted by the Council. The chair was taken by the President, Mr. G. C. Druce, M.A., F.L.S., at 10 a.m.

The PRESIDENT called upon Principal Mackay, who delivered the following address—

MR. PRESIDENT, ladies, and gentlemen,—I understand you have already been welcomed to Dundee, and welcomed in a most enthusiastic manner, by our Lord Provost last night. He has told you of all the great beauties and amenities of our city, and all the wonders we have for your observation. I need not myself dwell upon that subject, because the points are so self-evident that it would not be worth while to repeat them again. You are also, I understand, to make yourselves acquainted with the beauties of our river, and I need not dwell on that, for no words of mine could adequately paint to you those beauties—they must be seen for themselves. You are also, I understand, to have an opportunity

of visiting two of our neighbouring cities—St. Andrews and Perth—both rich in historical associations, but with all this wealth of associations of the past I am sure you will find them quite up to all the most modern ideas. But while all that refers more especially to the lighter business of this Conference, the welcome which I wish to extend to you refers to the more serious and the more important work of the Conference—that which is done within these walls. I understand it is now thirty-five years since the Conference visited Dundee, and I may say that I earnestly hope you will not allow such a long time to elapse again before you come back to this city. But those of you who were present thirty-five years ago at this Conference would find then no institution of the kind in which you are now met. If you come back in thirty-five years after this I feel sure none of you present to-day will be able to recognize the college then or see any likeness to what it is to-day. I am very proud to say that the great generosity of the citizens to the college has been manifested in a remarkable manner during the last six months—and that the college will be able to take at least some part in the great advance which all the Scottish Universities are making at present. We are putting up new buildings which will, when completed, make the college stand equal to any of its kind in Scotland. It seems to me particularly appropriate that this Conference should meet within this college. While the college busies itself with every branch of education there is no doubt that medical education is one of the most important parts of its work, and I may say the work of the Pharmaceutical Society is one which goes forward hand-in-hand with that of the medical profession. Their work is so closely allied that it is impossible but to see that without one another they could not succeed. The work of your Society is, I think, specially threefold. You are specially associated with the effort to improve the education of those who have the compounding and sale of medicines in their hand. Now such an effort is of the very greatest value, not only to the medical profession but to the whole community, and there is no thoughtful man who will not admit that the work done by the Conference is of the very highest value and deserves the most hearty recognition. Again, you are specially associated with the effort to improve the quality of drugs and the methods of their compounding, and those who are specially cognisant of the subject know that recent years have witnessed an improvement which is in all respects remarkable. It is now possible to keep the most delicate compounds practically

without change for many years, and the help that has been to the profession is also worthy of recognition. Also, you are specially associated with the effort to improve our knowledge as to the action of various drugs, and in that matter I may say we in this college, many of us, are working on parallel lines with the Society practically hand in hand. Professors of physiology, materia medica, and pathology are all directly associated with the work you are doing. I think you will find that the volume of work going forward from this college is equal to any other learned institution in the country. It is because the Conference engages in this work in association with the college, and these bodies are so closely related with one another, that I, on behalf of all my colleagues, wish you a hearty welcome here, trust the Conference may be successful in all parts of its work, and ask and earnestly invite you to return soon again to Dundee.

The PRESIDENT expressed the extreme gratitude of the members of the Conference for the very kind words of welcome which Principal Mackay had extended to them. It was true, as he had said, that in many ways the Conference worked on similar lines to that of University College. They rejoiced to see the way in which technical education was extending in Scotland, and the way it was taught in that college reflected the greatest credit upon the governing body of the college. He expressed the feeling of the Conference in offering their thanks to Principal Mackay, not only for letting them have the use of that building, so admirably fitted for their meetings, but also for the cordial welcome he had offered them that day.

### PRESIDENTIAL ADDRESS.

Mr. DRUCE said: More than a third of a century has elapsed since in the early days of the history of this Conference it met at Dundee to receive a generous welcome from Scottish chemists, and to listen to a discourse from the lips of the genial occupant of the botanical chair of the Pharmaceutical Society, Professor Bentley, then President of this Conference, "On the Study of Botany in connexion with Pharmacy," which was, in fact, a continuation of the subject he discoursed on at Nottingham the preceding year. In these addresses Professor Bentley showed how advantageous the study of botany is to the pharmacist, not only from a scientific but from a practical side. He proved how one conversant with

botany is enabled to detect adulterants in drugs, instancing the recognition of the florets of *Carthamus* in saffron ; that it gives a clue which is of great assistance in the search for new remedies ; and mentioned remedies which had been obtained from our indigenous plants, such as the oleo resin from the male fern and salicin from the willow and poplar. He then enumerated many of our native species which possess decided medicinal action, some of which at any rate were worth further and more complete trial. We must remember that at the time the professor was speaking the times were more favourable to the prosecution of truly scientific researches. In the present day the chief recommendations for a remedy to be adopted appear to be not so much its intrinsic value, but that its supposed qualities should have been lavishly vaunted by advertising through the medical Press, that its composition should be unknown, and that it should owe its origin to our continental or Transatlantic *confrères*. Professor Bentley went on to show that a knowledge of systematic botany is an important guide to the medicinal properties of plants, and how important the knowledge might be to a colonist or explorer, and, again, how useful it must be to the toxicologist. At Dundee he dwelt upon the subject chiefly to prove the value of botanical study not only as a mental training but as a means of recreation—such a study as would be eminently calculated to impart tone and vigour to the mind, to elevate the general character, and especially useful, as it leads to correct observation and accurate discrimination ; while from the fact that so large a proportion of the observations have to be made in the field, a use can be made of those hours which might otherwise be wasted in less useful and less wholesome pursuits.

After more than thirty years' experience, few members of this Conference would, I think, venture to controvert Professor Bentley's statements. We may regret that systematic botany, which at the date of the last meeting was taught by nearly every occupant of the professorial chairs of botany in the United Kingdom, is now almost without an expounder, with the result, as I said last year at Dublin, that Great Britain is falling behind her continental and Transatlantic rivals—a fact especially to be regretted when we remember the vast extent of the area which Great Britain occupies and the immense share in the vegetable products of the globe which we possess. Even in such a limited branch as that of works treating of the botany of the British Isles, the output during the last twenty years does not compare



favourably with that of France, Germany, Scandinavia, or the United States. This neglect of systematic botany extends to our own system of examination, but this is only in keeping with that unfortunate tendency to separate with ever-widening breach the practical from the theoretical knowledge of pharmacy in our examination system. The teaching of the two scientific subjects by instructors who have had no training in pharmacy, although perhaps unavoidable, necessarily tends to produce the same effect, so that the time is not far distant when what has been seriously asked for will be a *fait accompli*—namely, that qualification shall precede, and not follow, business training. The results are only too manifest in the deficient practical knowledge of the general routine of business affairs which characterizes so many of the graduates of pharmacy of the present day; nor can we praise a system which produces results which all of us acknowledge and most of us deplore.

#### THE PROGRESS OF SCOTTISH BOTANY.

Gentlemen, I must apologize for appearing before you to-day, for I feel fully cognisant that I can offer you but little that is interesting, but I must throw myself upon your kindness and long-suffering, of which I have had previous experience. Knowing Scotland so well as I do, and being so greatly attached to it as I am, I felt it very difficult to refuse the kind and flattering invitation to act as President of this Conference in this historic burgh. My only claim for your indulgence is my knowledge of these northern realms, for since I was a boy of sixteen, few years have gone by without my having spent some of my limited leisure, those *horæ subsecivæ* so much the more valued when difficult to obtain, in the country north of the Tweed. And I may say in further extenuation of my temerity, that as one who has tried to follow Professor Bentley's advice, each of these visits has had for its primary object the working out of the flora of those Scottish counties of which little was known. Therefore I trust you will pardon me if I dilate for a time, but in a confessedly inadequate and incomplete manner, upon the progress of Scottish botany, taking as an arbitrary starting-part the year 1684. This date is chosen because the records of the occurrence of plants in Scotland which had been made prior to that time were isolated, such as that of the round-leaved winter-green and the pine-tree in Parkinson's *Theatrum Botanicum* of 1640; and although certain edicts about the extermination of the corn marigold from corn-crops had

been promulgated, and Cargill had sent records of *Trientalis europæa* to Caspar Bauhin for insertion in the *Pinar*, while a few others were inserted in the *Catalogue of Plants* which the great naturalist Ray issued in the year 1670, when his colleague Thomas Willisel added to the British flora the viscid catchfly from the cliffs of Samson's Ribs, these were, as I have said, merely isolated references, and we may truly say that less was known at the date I mention by English botanists of the Scottish flora than they now know of the Egyptian or Burmese. As a rule the English excursionist to Scotland in the seventeenth century received no very cordial welcome, especially, as I believe was more frequently the case, their visits were not for strictly scientific purposes, and if any of the latter category really took place, no trace of their exploration exists so far as botany is concerned. Even as late as the eighteenth century, as many of you will remember, Boswell, in his *Journal of a Tour to the Hebrides* with the great lexicographer Samuel Johnson, speaks of such an undertaking in a more serious light than one would now feel if he contemplated a visit to the Caucasus. Johnson says he "was prepared for some inconveniences and hardships, and perhaps a little danger, but these he thought were somewhat magnified—as, for instance, by Voltaire, who looked upon him with great wonder when he heard of his intention, as if he had talked of going to the North Pole, and, being asked if he wished Voltaire to accompany him, replied 'No, sir.'" "Then," said Voltaire, with that charming touch of unselfishness which is even occasionally the attribute of philosophers, "I am very willing you should go." You will remember that on this journey Boswell and Johnson visited Montrose, and to prove how multifarious his learning was, Dr. Johnson went into an apothecary's shop and ordered some medicine for himself, writing the prescription in technical characters, so that the *Boy* took him for a physician. As no ill result followed, we may assume that the doctor's characters and the boy's interpretation of them were both unimpeachable; and we also get a side-light thrown upon the employment of unqualified labour, showing that it is hallowed by ancient usage, at any rate so far as apothecaries are concerned. My starting-point, therefore, is the year 1684, when a book appeared which treated of the natural history of Scotland under the title of *Scotia Illustrata sive Prodrromus Historiæ Naturalis*, etc., by Robert Sibbald, which was compiled on somewhat similar lines to that excellent work on the natural history of Oxfordshire by Dr. Robert Plot, which was

published in 1677, and, like that work, besides treating of natural science in its broader meaning, also enumerated with some degree of thoroughness the flora of the district under review

#### THE FATHER OF SCOTTISH BOTANY

Sibbald, who may be not unjustly termed the father of Scottish botany, was born in Edinburgh in 1641, being the son of David, third brother of Sir David Sibbald. In 1650 he was sent to the Burgh School of Cupar Fife, but the next year his parents removed to Dundee, where, during the time of trouble caused by the siege of the town by Monk, young Sibbald narrowly escaped with his life, and his father was severely wounded. During the pillage of the town the family were robbed of nearly all they possessed, and had to return to Cupar Fife on foot. Young Sibbald was then sent to the Edinburgh High School, and eventually to the University. In 1660 he went to Leyden for eighteen months, where he took the degree of M.D., then studied for nine months in Paris, and proceeded to Angers, where he took the degree of M.D. in 1662. On his return to Edinburgh, and stimulated by the example of the University of Oxford, which in 1632 had established a Physick Garden, in conjunction with Sir Andrew Balfour he was instrumental in forming the Botanical Garden at Edinburgh in 1680. This was so excellently cultivated by James Sutherland that in 1683 it is said to have contained 3,000 species of plants, disposed according to the method of Robert Morison, a native of Aberdeenshire, and Regius Professor of Botany in the University of Oxford, who published the first volume of his *Plantarum Historia Universalis Oronuncensis* in 1680. Sibbald was also instrumental in founding the College of Physicians in Edinburgh, for which a Charter was obtained on November 2, 1681, and of which he was appointed President in 1684, this year also witnessing the publication of his *Scotia Illustrata*, already alluded to, and which, from its containing a list of 381 species and varieties of plants observed in the King's Park of the Scottish capital, shows that Sibbald had been a careful observer of the flora which occurs in the vicinity of "Scotia's Darling Seat." In 1685 he was appointed first Professor of Medicine in the University by the Town Council, and was knighted by Charles II, who also made him King's Physician and Geographer Royal, but beyond a fee of £100 received from King James (I suppose I ought in this place to say the Seventh) he does not appear to have benefited pecuniarily from the Royal favour. About 1685 he became a

Roman Catholic, and narrowly escaped assassination at the hands of an infuriated rabble of Protestants, and his unpopularity in Edinburgh became so great that he was obliged to leave and take up his residence in London, where, contrary to the usual experience of his compatriots, he did not make substantial progress, and it is said, owing to finding the Jesuit at close quarters less agreeable than fancy painted, he saw reason to return not only to Edinburgh, but to the faith of his forefathers.

Sibbald's *Scotia Illustrata* was, he tells us, the result of twenty years' labour. The first part, of over 100 pages folio, treats of geographical and archæological details, while the second portion enumerates those plants growing in a natural condition in Scotland, and of which nearly 500 are mentioned, besides colour-forms and varieties, but many of the species given are not really native plants of Scotland, and some are difficult to identify. It is rather remarkable that so few truly Alpine or even typically Scottish species are included; indeed, only two species are recorded for the first time as British—namely, a rosaceous plant which was put into a separate genus named *Sibbaldia* by Linnæus in the first edition of the *Species Plantarum* in 1753, but this genus is now merged with *Potentilla*, and the plant, instead of being called *Sibbaldia procumbens*, is known as *Potentilla Sibbaldi*. The second species is that interesting umbelliferous plant *Ligusticum scoticum*. These are practically limited to Scottish localities. Sibbald's list, however, contains several other interesting plants; for instance, the forked spleenwort (*Asplenium septentrionale*) and *Lychnis viscaria*, which had been discovered by Thomas Willisel in 1670 on Salisbury Crags, but now nearly eradicated from that locality. A few species of mosses, seaweeds, and fungi are also included. Alexander Pitcairn, the writer of *Vita Morisonii*, criticized Sibbald's book virulently.

#### A GAP OF A CENTURY IN THE RECORD.

Between the years 1680 and 1777 very little published work exists which adds anything to our knowledge of Scottish botany. In Martyn's *Tournefort*, *Carum verticillatum* is recorded in 1732, *Oxytropus uralensis* was found by Dr. Walker in 1761, and *Eriocaulon septangulare* from Skye is reported in the *Phil. Trans.* for 1770. The times were unpropitious and the influences adverse to the spread of scientific knowledge. Civil wars went on in a most incivil fashion, foreign wars were waged which shut out Britain from Continental intercourse, and but little more was

known of Scottish botany ninety years after the appearance of *Scotia Illustrata* than could be gained from the pages of Sibbald's book. It was reserved for an Englishman to make the next considerable advance in the knowledge of the flora of these northern lands in the issue by Dr. John Lightfoot of the *Flora Scotica* in 1777. Lightfoot was born at Newent, in Gloucestershire, in 1735, and was educated at Crypt School, Gloucester, entering Pembroke College, Oxford, in 1753, taking his degree of B.A. in 1756, and his M.A. in 1765. Having entered Holy Orders, he became chaplain and librarian to the Dowager Duchess of Portland, that well-known lover of botany, at her beautiful seat of Bulstrode, in Bucks, she being attracted by his cheerful disposition, courtly manners, and love for botany and conchology, for which Her Grace paid him the not exorbitant stipend of £100 a year; but he also had the curacies of Colnbrook and Uxbridge, holding the latter to the day of his death. He held the living of Shelden, in Hampshire, and Gotham, in Nottinghamshire, and then Cowley, in Middlesex. In 1772, by the invitation of the celebrated antiquary Pennant, he travelled with him through Scotland, as he says—

“From the south of Annandale to Sutherlandshire, visited most of the Hebrides except the Long Island, traversed the kingdom from Argyleshire to Mearns—that is, from the western to the eastern shore—and afterwards returned from England by way of Edinburgh and Kelso; that in all this tract, which took up the daily exercise of a whole summer, I embraced every opportunity of scaling the highest mountains, climbing the most rugged rocks, penetrating the thickest woods, treading the fallacious bogs, winding upon the shores of seas and lakes—in short, of examining every variety of land or water which promised to produce a variety of vegetables.”

#### EIGHTEENTH-CENTURY WORK AND WORKERS.

Lightfoot's *Flora Scotica* was written in 1777, and was issued a year later, at the expense of Pennant, in two volumes. As was the case with Sibbald's book, it met with some severe criticism, but the initial merit of the *Flora Scotica* was too great to suffer long. Pennant supplied about sixty pages, in which the fauna of Scotland is described; the remainder of the 1,147 pages are devoted to the flora, in the preparation of which Dr. Lightfoot acknowledges his indebtedness to several scientists, among whom may be mentioned Dr. Hope, Professor of Botany at Edinburgh, the Rev. Mr. Stuart, jun., of Luss, formerly of Killin, in Breadal-

bane, the companion of Lightfoot through the Highland journey, who was well versed in the Gaelic language, and who was the discoverer of several new plants. The Rev. Dr. Burgess, of Kirkmichael, in Dumfriesshire, contributed notes on the Lowland botany; others were made by Dr. Parsons, a student of Edinburgh, afterwards Professor of Anatomy at Oxford; and Mr. Yalden, a medical student of Edinburgh, supplied a catalogue of plants growing in Edinburgh Park. Lightfoot also acknowledges assistance given by Dr. Solander, Sir Joseph Banks, and Dr. Sibthorp, of Oxford, the last-named allowing him to consult the valuable *Cryptogamic Herbarium* of Dillenius. One may mention in passing that while staying at Oxford, Lightfoot added several plants to the Oxfordshire flora, among them being the fritillary or snake's head, a conspicuous ornament of our Oxford meadows which had strangely enough not been recorded previously. The cryptogams are very largely represented in Lightfoot's flora, 119 species of mosses, 103 lichens, 81 algæ, and 87 fungi being described. The flowering plants and ferns are about 840 in number, but a large number of these are only naturalized plants in Scotland. About 1,250 species altogether are, therefore, included in the flora.

During the closing years of the eighteenth century we have a few records, but these will be best considered in connexion with the work of Sir James E. Smith, who, in his important contributions to the knowledge of British botany, focussed much of the scattered information relating to British plants. It will be unnecessary to enter into any biographical details respecting such a well-known *savant*, but I may remind you that we are also indebted to his acumen for obtaining the valuable herbarium and collections made by Linnaeus, which are now preserved in the Linnean Society—a society of which he was also the primary founder. His *magnum opus* was English botany, in which he described the plants of the United Kingdom in thirty-six volumes, which was begun in 1790 and finished in 1814, the plates being from the hand of James Sowerby. In the interim Smith had also produced the *Compendium Floræ Britannicæ* and the *Flora Britannica*, the latter in 1800–4. These works contain upwards of a hundred additional species to the Scottish flora, besides numerous varieties, but many were only naturalized and not native species. In addition, about a score were recorded which are either erroneous or require recent verification. On the other hand, numerous willows, which were then described as species, are now

considered to be only varieties, hybrids, or forms, and these are not reckoned in the additional species cited above. It will therefore be seen how important was the contribution to Scottish botany which we owe to Sir James E. Smith. He was fortunate enough in enlisting a number of botanists, for although he himself visited Scotland and climbed Ben Lomond, where he gathered *Luzula (Juncoides) spicata*, he did not himself add materially to the flora. Some of the above 100 additions are preceded in other publications. I have neither time nor space to notice all, but I may in passing refer to a list of plants published in the Linnean Society's *Transactions*, which was read at a meeting in 1793 by James Dickson, a nurseryman of Covent Garden, who had made two journeys to Scotland—one in 1789 and the other in 1792—and between 1793 and 1802 issued a set of nineteen fasciculi of plants.

Other coadjutors of Smith were John Mackay, of Leith Walk Nurseries, Edinburgh, and James Townsend Mackay, a native of Kirkcaldy, afterwards curator of Trinity College Gardens, Dublin, who did much good work at the Irish flora (see *Cyb. Hib.* ed. ii, pp. 28, 29). To one or other of these we owe the records of the so-called *Poa laxa*, *Festuca sylvatica*, *Scirpus Tabernaemontanus*, *S. multicaulis*, *Pyrus pinnatifida*, *Pinguicula alpina* (with some doubt), and some others contemporaneously with George Don.

James Brodie, of Brodie House, discovered the rare and beautiful *Moneses grandiflora*, which was figured in 1794 from the woods of his charming neighbourhood, and also *Erythraea littoralis* as the form *minor*, Hartm., from the Elgin coast, which Smith misnamed *Chironia pulchellum (E. ramosissima)*.

Professor Beattie, of Aberdeen, was the discoverer of the beautiful *Linnaea borealis* to the British flora from the firwoods of Mearns, and of *Carex Davalliana* (but Smith was in error in so naming it, as it is only a form of *C. dioica*), *C. laxigata*, *C. Michelliana* (a variety of *C. flacca*), and *C. binervis* (E. B. t. 2, 236), all of which Smith described as new species from Beattie's specimens from the neighbourhood of Aberdeenshire.

But the chief worker at the Scottish flora for many years was a botanist who has received a most unfair share of neglect and misrepresentation, which I hope may be in some degree dispelled, at any rate, from the minds of such of you who may have been influenced against him. I allude to a Forfarshire man, George Don. It was once my misfortune to dislocate my ankle while on a

botanizing expedition in Forfarshire, but the accident met with compensating advantages, for I used some of my enforced leisure in examining a collection of plants which had been made by Don, and is now in the possession of Mr. John Knox, of Forfar. At that time I shared the current opinion about Don, and treated his records with scanty respect, since over twenty species are mentioned in Hooker's *Student's Flora* to be "Don's reputed discoveries." My examination of his herbarium and of the fasciculi issued by Don led me, however, to take a different view, and in 1884 and 1885 I published a series of articles in the *Scottish Naturalist* on "The Botanical Work of George Don," from which I abstract some of the following remarks, supplementing them with such additional information as may have come to my knowledge. I am also indebted to the *Biography of George Don*, by John Knox, l.c. 1881, April-October, which gives a vivid picture of Don, and also a memoir by Patrick Neill, LL.D., of Canonmills, in the third volume of the *Botanical Gazette*.

#### THE LIFE OF GEORGE DON.

George Don was born in the parish of Muirhead in 1764, and was baptized in October, his father being Alexander Don and his mother Isobel Fairweather; both parents were descended from respectable farmers in the parish, and his father was a shoemaker or currier, who afterwards settled in Forfar. George Don received the ordinary elementary education at the parish school. He had a natural turn for mechanics, and acquired a taste for reading and observation, but his real education was got out of doors, in the fields and by the loch-side, and from his boyish days he took delight in noticing the minute characters of such birds, insects, and plants as came within his reach. He wrote a bold hand, and his style was clear and vigorous. He was apprenticed to a clockmaker in the town of Dunblane, and there formed his first *hortus siccus*, consisting of all the flowering-plants and mosses which he could collect in the neighbourhood. When he became a journeyman he removed to Glasgow, and there he generally worked five days a week at his business, being able to make a clock in that time, and the rest of the week was devoted to botanical exploration; occasionally he stole an extra day or two, penetrating into the Highlands as far as to Ben Lomond or Ben Lawers. He afterwards went as a gardener to Dupplin Gardens, where a relative was in charge, and there he spent some years, using his scanty leisure to explore the Ochills and even the spurs of the



Grampians, thus obtaining a good knowledge of the local flora. On one of these expeditions he met Caroline Stewart, an active, energetic woman, to whom he was afterwards married.

On leaving Dupplin he went southwards, spending a short time near Bromsgrove, in Worcestershire, in 1784, then returned to Edinburgh, where he became friendly with Messrs. Mackay and Dickson. About 1790 he settled at Forfar, and, with the small sum of money he and his wife had saved, leased, at a low rent, from Mr. C. Gray, of Carse, two acres of land, on the condition that he should build a cottage of certain dimensions within a limited period. This piece of ground, which he called Dove Hill, sloped to the west into what at one time had been Forfar Loch. Here he formed a large artificial pond, which he stocked with aquatic plants and fish, leaving room for a broad border, in which the native plants were arranged according to the Linnean system and grown in their appropriate soils. In addition, he rented several acres of land as a nursery for young trees; but it is said he gave more time to his botanical treasures than to the more profitable cultivated sorts. About this time he was particularly eager in exploring the Highlands, and not the least interesting of his discoveries is that of the beautiful district of Clova, which he first made known to the botanist. He occasionally absented himself for a week at a time, his plaid and a bag of oatmeal or some bread and cheese sufficing him for shelter and sustenance; and he lost count of the days in these toilsome expeditions, so that it is said he once presented himself at the manse of St. Vigeaus laden with specimens on a Sabbath morning as the occupants were going to kirk. There he met his friend the minister, and asked him, "What day's fast or Sabbath?" He got his answer, and replied, "Man, I have lost count, but if I had my hands and face washed I would gang to the kirk too." He was shown to a bedroom for this purpose, but when Mr. Muir, the minister, went to call him he found him fast asleep. He had it out. Not only Clova was repeatedly worked, but he visited the distant Ben Nevis, where he gathered *Sagina alpina*. When on Ben Lawers in 1793 he observed the long-legged plover and gathered *Arenaria sulcata*, etc. For these long rambles he was especially fitted, being stalwart and blessed with great powers of endurance, often journeying without breaking fast for a period of twelve hours. He would bring home a heavy burden of plants for his herbarium, or roots to be planted in his garden, or, as was frequently the case, for sale to correspondents scattered over Britain. One of these correspondents was the Countess of Aylesford, who

had set herself the task of making water-colour drawings of the British plants, and she early enlisted the aid of Don. The drawings are now in the possession of a descendant, the Dowager Countess of Dartmouth, and the plants, instead of being thrown away, were kept, and are now in the collection of another descendant of Lady Aylesford's—my friend, Miss C. E. Palmer, of Odiham—and an examination of them confirms my opinion as to the *bona fides* of Don. He sent many specimens to Sir J. E. Smith which are figured in *English Botany*, and to Dr. Goodenough, afterwards Bishop of Carlisle. It is said that he once received a visit from the Bishop, who, being at Forfar, and inquiring for Mr. Don, was first taken to the house of a Colonel Don, and finding that was not the man, he was conducted to the botanist, whom he found busy at work, and with whom he was soon in cordial conversation, to the wonder of his guide. Dr. Neill also relates that "being on a pedestrian excursion along the east coast it occurred to me that Forfar ought to be visited for its remarkable botanical garden and its owner, whose fame was familiar to me, owing to my intimacy with his regular correspondent, Mr. John Mackay, of the Leith Walk Nurseries. On reaching Forfar towards evening I soon found Don's garden, and, entering, inquired of a very rough-looking person with a spade in his hand, whom I took for a workman, whether Mr. Don was at home. The answer was, 'Why, sir, I am all that you will get for him.' Having apologized in the best manner I could, I stated that when I left home I did not anticipate a visit to Forfar, else I could have brought a letter of introduction from Mr. John Mackay. Don pointed to my botanical box and immediately said, 'That is enough for me.' . . . Next morning at six he conducted me to Restennet Moss, where I had the great satisfaction of procuring a living patch of *Eriophorum alpinum*, and a number of fine specimens for drying. The Moss was at this time partially drained, for the sake of a rich deposit of marl, but at one end there was still sufficient marsh for the growth of *Cladium mariscus* and *Eriophorum angustifolium*, and, of course, for the rare *E. alpinum*, which grew in the drier and firmer part of the Moss."

At the end of the year 1792 Sir J. E. Smith and Mr. James Brodie, of Brodie, strongly recommended Don to Professor Rutherford, of Edinburgh, as a Superintendent of the Botanic Garden there; he was accordingly appointed, and removed to Edinburgh, leaving his Forfar garden in the care of his father, who was himself a great cultivator of flowers for amusement, but followed the

trade of a currier. Don only remained three years at Edinburgh, as the relations between the professor and himself became strained, for while Don had comparatively little experience of stove-plant cultivation, there is no doubt his botanical knowledge was far in advance of the professor's. During his residence at Edinburgh he attended nearly all the medical classes, with the view to ultimately following that profession, and on his return to Forfar, in 1795, it is said, he started practice ; but his love of botanical rambles told heavily against him, and as he was so frequently away when wanted, his practice gradually dwindled. In 1803 he was elected an Associate of the Linnean Society in recognition of his services to botany. In 1804 he began the publication of a *Herbarium Britannicum*, which was dedicated by permission to Sir Joseph Banks, then President of the Royal Society. Four fasciculi, each of twenty-five plants, were to be issued yearly, and these were to contain a due proportion of rare alpine.

"Since he first began his botanical excursions into the Highlands of Scotland, in the year 1779, he is confident (and he hopes he may mention it without the imputation of vanity) that he has traversed more of the Caledonian alps than any other botanist has ever done. He has repeatedly ranged over the great mountains of Angusshire which surround the great district of Clova, where no one on a similar pursuit has ever preceded him. He has also searched the vast range of mountains which stretch about sixty miles through the district of Knoydart, in Inverness-shire, a region which had never before, nor has since, been examined by a botanical eye. He is the only botanist, too, who has explored the lofty mountains of Cairngorm and the great hills of the neighbourhood." So he wrote in his preface.

As time went on Don's business became more and more scanty, until in 1812 he had to come to some sort of arrangement with his creditors, and from this blow he never recovered. He came home in the autumn of 1813 from one of his excursions, labouring under a severe cold, which he neglected ; he grew worse, and a suppurating sore throat followed, which caused him excruciating agony for six weeks, when he succumbed in the January of 1814—he and his family being during his last illness so poor as to literally depend for their daily bread on the charity of the neighbours. His funeral was one of the largest that had ever been seen in Forfar, then having a population of about 5,000 ; the whole town as well as many friends and acquaintances from the country followed the coffin to the grave in the churchyard.

Through the efforts of Dr. Neill, Mr. Booth, and Sir J. E. Smith a sum of money amounting to £80 was collected, and this was remitted to the widow, so that she was enabled to bring up her children, six in number. The eldest, a girl, died shortly after her father. Of the five boys three became nurserymen; but David and George, having considerable ability, struck out new paths, the former eventually becoming a celebrated botanist and Secretary to the Linnean Society.

#### AN ESTIMATE OF DON'S WORK.

Don's chief publication was *An Account of the Native Plants in the County of Forfar, and the Animals to be Found there*, forming an appendix to the *General View of the County of Angus or Forfar*, by the Rev. James Headrick, Minister of Dunnichen, which appeared in 1812. Don's share extends to forty-nine pages. He mentions ninety species of flowering plants, 100 mosses, and 120 lichens from Clova. The sub-alpine plants lying between the alpine district and the lowest part of the valley of Strathmore are noticed; there he discovered *Caltha radicans* and *Crepis pulchra*, the latter a casual plant since extinct (E. B. 2,325, and Syme, E. B. v. 217). Then he discusses the flora of the lochs and marshes in the neighbourhood of Forfar, where he planted *Stratiotes*, and he noted nine species of pondweeds from Rescobie Loch. He next describes the plants growing between the valley of Strathmore and the sea. Lastly, the sea-coast, from North Water Bridge, Montrose, Arbroath, Sands of Barrie, Dundee, and the banks of the Tay to the western boundary of the county, are pleasantly described. Altogether about three hundred "larger plants" are enumerated, and he says that most of these could be seen growing in his garden at Forfar.

As I have said, his botanical reputation has since suffered, especially at the hands of Dr. Walter Arnott, of Glasgow, from the fact that of all his many records about a score have not been re-found in the localities given by Don. A critical examination of a list of Don's discoveries enables us to bring his work into more correct focus, and to obtain a position favourable to arrive at a more accurate idea as to the authenticity of his records. But it is only fair to remember that in the time when Don lived the same precision of locality was not demanded of the botanist, nor was the same importance attached to the fact that a specimen should come from the locality printed on the label as is now given. Then the specimen itself was valued just as a stamp is now valued by the

philatelist, and the other factors as to where it came from or by whom collected were to some extent ignored. Therefore we find that Don, even in his own herbarium, wrote out the localities of certain species from text-books before the plants were obtained; indeed, in some instances the space for the plant is still unoccupied. By this practice a loophole for error is at once presented. Again, the geography of Scotland was imperfectly known, so that Don was often very vague in his localities; and if, as sometimes occurred, he gave them from memory, another source of error is offered. Then, too, Don was a florist, and a florist in poor circumstances, and it is quite conceivable that he may, in some instances, have intentionally withheld the exact locality from business motives, so that another in the same trade should not take toll. And it must also be borne in mind that when he lived no British botanist had any but the most elementary knowledge as to the indigenuity of plants. We therefore find that in such a standard work as *English Botany* a large number of species are inserted which have no claims to be considered natives of Britain, although found growing in a wild state; and this is even true of Sir W. Hooker's *Flora Scotica*. We therefore need not be surprised to find Don recording such alien plants as *Hypericum barbatum*, *Chærophyllum aureum*, etc.

Then Don brought home many specimens, either in seed, root, or flower, and grew them in his garden; and any one who is conversant with the difficulties under which all botanical gardens labour in the shape of misplaced labels, the encroachment of one species upon the domain of another, in the case of annuals by seed-scattering, or in perennials by root-creeping, one need not be surprised to find that Don, poor and overworked as he was, with three hundred British species in his Forfar garden, may have fallen a victim to the unconscious transference of labels or specimens. To one or other of these causes may, I think, be attributed the records of such plants as *Potentilla tridentata* and *Tussilago alpina*, and we need not insult his memory, or demean ourselves, by imputing gross attempts to impose upon the credulity of his fellow-botanists. On the other hand, we must remember with gratitude the enormous energy which enabled him to add such a lengthy list of species to his country's flora. This work was done, as so often it is obliged to be done, against adverse influences, and without the advantages of rank and fortune, but with the compensating assets, which untiring zeal and patient industry, and the inborn touch of genius, gives to any of Nature's children who have

been enriched with its heritage—that something which no worldly gifts can endow us with in a similar way. Don unmistakably was so gifted, and it kept him steadfast at his labours. He had besides that talent of discriminating slight differences which is lacking to many systematic botanists; but none can be truly great who is not its possessor. This discriminating power is evidenced again and again in his acute remarks upon his specimens.

As I have said, Don was too independent in opinion to curry favour with the wealthy, and too fond of Nature—by which I mean science in the truest sense, that hard mistress in some respects as she is to the poor—to make himself rich by continuous application to business. George Don, like Robert Dick, is an instance—and there are many in the working classes—of a life devoted to one idea; heroes assuredly, yet reaping no reward, except such reward as earnest and true work done for its own sake itself confers.

Yet, despite the apparent failures of such lives as Robert Dick, George Don, and Thomas Edwards, they stand out in marked and agreeable contrast to the insipidities, the mediocrities, or the merely fashionable crowd. If any one of those who have lived these self-sacrificing lives has committed errors—and who among the wisest has not?—for the sake of justice let us deal mercifully with him, and certainly not bring lightly charges against his good faith. In the case of Don, some of us, and assuredly all of us who have trodden over the same lovely country which he has made known to us, and who have gathered in the same localities the rare and beautiful specimens he has discovered or has left records of, will assuredly feel not only gratitude for what his labours have gained for us and made our common possession, but also respect for the independent and sturdy character of the man who lived such a life of toil and endurance.

#### THE WORK OF OTHER BOTANISTS IN SCOTLAND.

At Don's death the garden at Forfar was taken over by Thomas Drummond, but he did not retain it long, as he became Curator of the Belfast Botanic Garden, and accompanied Franklin on his second Arctic Expedition, afterwards collecting specimens in America, Canada and Texas. Drummond issued two fascicles of Scottish and two series of American mosses. He stands as the first recorder of *Juncus balticus*, Willd. (see E. B. 2621 [1830]), but that had been found previously by Geo. Don, and thought to

be *J. fliformis*. Drummond also recorded *Salix lanata* from Clova (see *E. B.* 2624), *Equisetum pratense*, Ehrh. (*E. Drummondii*, *E. B.* t. 2777 [1833]), and *Lathyrus niger*, Wimm. (*Orobis niger*, see *E. B.* t. 2788) from Den of Airlie (see Hook. *Fl. Scotica*, 1821).

William Borrer, a well-known English botanist, who contributed some important discoveries to the Supplement to *English Botany*, made visits to Scotland and added several species to our flora, among them *Nuphar pumila* (see *E. B.* t. 2292 [1811]; *Fumaria densiflora*, DC. (see *Trans. Bot. Soc. Ed.* i. 34 [1840]); *Stachys ambigua* (with Sir W. Hooker, 1809) see *E. B.* t. 2089 [1809]; *Rosa cæsia*, Sm. (see *E. B.* t. 2367 [1811]); *Hieracium pulmonarium* (see *E. B.* 2307 [1811]) (probably *H. chrysanthum*); *Carex Mielichhoferi*, Craig Cailleach (*E. B.* t. 2293 [1811]), but this is a form of *C. vaginata*, found previously by Don.

Arthur Bruce, Secretary to the Natural History Society of Edinburgh, recorded *Polygonatum verticillatum* (see *E. B.* t. 128 [1793]), which he found in 1792 (Don claims to have been the prior discoverer), and he sent *Galeopsis Laudanum* (see *E. B.* 884), *Salix reticulata* (see *E. B.* t. 1908 [1808]) (previously recorded) to Sir James Smith, and *Callitriche autumnalis* (see *E. B.* 2606 [1829]).

Thomas Hopkirk, of Paisley, published a *Flora Glottiana* (1813), in which one new species is described, namely, *Veronica hirsuta* from Ayrshire, but it is now considered to be only a variety of *V. officinalis*. Hopkirk enumerates altogether some 662 species, of which about forty are additions to the Scottish flora, but they consist principally of aliens and casuals. The list is obtained chiefly from the banks of the Clyde and the neighbourhood of Glasgow.

Sir William Jackson Hooker, born at Norwich in 1785, became Regius Professor of Botany at Glasgow in 1820, and was so well-known and distinguished a botanist that I need but make the barest reference to him. At the time he went to Glasgow he was already the author of the *British Jungermannia* and of *Muscologia Britannica*. Having travelled, as he tells us, once in company with Mr. Borrer, and another time with Mr. Turner, the excursions extending over by far the greatest part of the country, in 1821 he published a *Flora Scotica* dedicated to the Duke of Montrose. In this work Sir William Hooker describes 1,071 species of flowering plants and fifty-two of the higher cryptogams as occurring in Scotland, but from this total must be deducted the balance

of twenty-two left after subtracting those plants—twenty-one in number—which are now considered to be species, but which Hooker treated as varieties, from the larger number of forty-three, to which in the *Flora Scotica* full specific rank is given, which are now considered to be only varieties. There is also a considerable proportion of errors, amounting to forty-two, so that about 1,059 species are actual constituents of the Scottish flora. A very considerable number of these are only naturalized, and not native species. To George Don, wholly or in part, nearly fifty records of species are due. Altogether about ninety species are added to the Scottish flora.

To Sir William Hooker we also owe the publication, either in the *Comp. Bot. Mag.* or in the five editions of the *British Flora*, 1835–1842, of the records of *Erophila inflata*, *Arenaria norvegica* (discovered by T. Edmondstone), *Rumex conspersus*, *R. aquaticus* (found by Mr. Goldie), *Potamogeton prælongus* (Brechan), *Primula scotica* (in Curtis *Fl. Lond.*), *Carex aquatilis* and *C. rupestris*, 1836 (found by Dr. Dickie and Mr. Templeton), *Ononis reclinata* (found by Professor Graham; Hook., *Bot. Mag.* i. 119), *Stachys ambigua*, t. 2089 (see also Borrer).

Alexander Murray, of Aberdeen, published in 1836 the first part of the *Northern Flora*, a description of the wild plants belonging to the North and East of Scotland, which, however, did not add anything of special interest.

David Don, son of George Don, of Forfar, afterwards Librarian to the Linnean Society, contributed a paper to the Wernerian Society, which described several Scottish plants.

Robert Kaye Greville, of Edinburgh, published the *Scottish Cryptogamic Flora* in 1823–28, *Flora Edinensis* in 1824, and the *Alga Britannica* in 1830. These important works did much to forward the knowledge of Scottish cryptogamic botany, but Dr. Greville also was the joint discoverer of those rare alpine *Carex alpina* and *Astragalus alpinus*.

Dr. George Gordon, of Birnie, near Elgin, published in 1839 *Collectanea for a Flora of Moray*. He discovered *Pinguicula alpina* in the Black Isle in 1831, although James Mackay is said to have gathered it in Skye previously, but the record awaits confirmation.

Professor John Hutton Balfour, of Edinburgh, published a *Flora of Edinburgh* and its environs in 1863, and by taking his class of botanical students into the mountainous districts did much to encourage botanical research. He added *Sagina nivalis* to the



British flora, which was gathered in 1847, but remained undetected in his herbarium until 1863.

Professor George Dickie, of Aberdeen, the author of *Flora Aberdonensis*, 1839, and the *Botanist's Guide to Aberdeen*, 1860, was among the first to discover *Eleocharis uniglumis*, and was the joint discoverer of *Carex lagopina*, *C. rupestris*, and *Cystopteris Dickieana* to the British flora.

Professor Robert Graham preceded Sir W. Hooker in the chair of botany at Glasgow, and afterwards became professor of botany at Edinburgh. He added *Ononis reclinata* to the British flora from the Mull of Galloway, and was a joint discoverer of *Astragalus alpinus*, and he recorded *Thlaspi alpestre*, *Erodium maritimum*, *Saxifraga caespitosa*, and *Senecio tenuifolius*.

William Gardiner, an umbrella-maker in Overgate, Dundee, published in 1848 the *Flora of Forfarshire*, arranged according to Hooker's *British Flora*. In the introduction, Forfarshire is computed to contain about 537,600 acres, of which about 200,000 are under cultivation, the soil being rich and most variable, rising from the sea-level to over 3,000 feet. Gardiner gives an excellent description of the mountainous part known as the Clova district, and he is among the early observers or recorders of *Silene conica*, *Myosotis caespitosa*, *M. collina*, *Luzula erecta*, *Lolium multiflorum*, *Mimulus*, *Rhinanthus major*, etc.

#### RECENT WORK ON THE SCOTTISH FLORA.

Time will not allow me to trace the building-up of the Scottish flora further, except in epitomizing to say that Mr. H. C. Watson explored Scotland in order to trace the distribution of species, not only geographically, but also through the various zones of altitude, and his work on the *Geographical Distribution of British Plants* (1835), his *Cybele Britannica* (1847-60), and other publications show how much we are indebted for his scientific and thorough research. James Backhouse, of York, explored the districts of Braemar and Clova, and his work on the *British Hieracia*, published in 1856, added many species to our flora. More recently, Mr. A. Brotherston, of Kelso, added *Potamogeton Zizit*; and Robert Dick, the baker naturalist of Thurso, immortalized by Smiles, found *Hierochloa borealis* and *Calamagrostis strigosa* in Caithness. To John Thomas Irvine Boswell, formerly Syme of Balmuto, Fife (whose wife was a descendant of Boswell, the biographer of Dr. Johnson), we owe the preparation of the third edition of *English Botany*, published between 1863 and 1884. He

added *Zannichellia polycarpa* to our flora, and in his *magnum opus* did much to assist British botanists by the excellent descriptions he drew up.

Dr. Buchanan White, of Perth, a born naturalist, whose premature death all must deplore, published an *Excellent Revision of the British Willows* and compiled a *Flora of Perthshire*, published posthumously under the able editorship of Professor Traill, of Aberdeen. Dr. Buchanan White did excellent and systematic work, describing several new varieties and adding much to our knowledge of the comital distribution of Scottish plants, as well as re-finding *Salix doniana*. John Sadler, curator of the Botanical Gardens at Edinburgh, discovered in 1874 a sedge which he thought was *C. frigida*—i.e., *Carex Sadleri*—and a hybrid willow, *Salix Sadleri*, in Glen Callater. Abraham Sturrock, of Rattray, a Forfarshire man, and a valued friend of my own, explored the lochs in his charming neighbourhood, and was rewarded by finding a new pondweed, *Potamogeton Sturrockii*, and also *Chara fragalis* var. *Sturrockii*. Frederick Jansen Hanbury has, during the last twenty years, explored many parts of Scotland with excellent results, and in his beautiful monograph of the *British Hieracia* has described many of the species of that genus, in which Scotland is so peculiarly rich. The Rev. E. F. Linton and the Rev. W. R. Linton have also added much to our knowledge not only of comital distribution, but also have specialized in those critical genera the hawkweeds and willows, and while they agree in materially reducing the number of the latter species, have freely added to the former. The Rev. E. S. Marshall has also been indefatigable in exploring various parts of Scotland, especially the mountainous portions of the Highlands, and has been successful in company with Dr. Shoolbred, in adding *Carex chordorrhiza* to the British flora. The Rev. E. S. Marshall has also added *Ranunculus scoticus*, *Cochlearia nicacea*, as well as some species of *Hieracium* and *Euphrasia*. Mr. Frederick Townsend, of Honington Hall, Warwickshire, has added *Euphrasia scottica*, and describes *E. foulensis*, as well as having published details of the distribution of the genus recently monographed by Dr. Wettstein. Mr. W. H. Beeby has on two or three occasions visited the Shetland group, and published an interesting list of the plants observed in that remote group of islands. The discovery of *Hieracium zetlandicum* and some other forms is due to his energy.

Mr. J. Cosmo Melvill and Mr. Charles Bailey have both added

considerably to the knowledge of plant distribution in Scotland; the former re-found Don's *Triticum alpinum*. Mr. Grant, of Caithness, has been fortunate enough to discover *Carex salina* in that country, and Mr. Hart has gathered *Arabis alpina* in the Cuchullis in Skye; in 1888 the Rev. W. B. Boyd found a new *Sagina*, afterwards named *Boydii* by Dr. Buchanan White; Mr. Brebner, of Dundee, found *Scleranthus ferrugineus* near Loch Tummel in 1884 (now, it is to be feared, extinct), and re-found *Carex ustulata* in 1885 in Glen Lyon. Mr. Arthur Bennett, although he has never visited Scotland, has by his work on the *Topographical Side of Scottish Botany*, not only given an impetus to the study, but has amassed a most valuable amount of material. We are also indebted to the researches of Messrs. A. Somerville, J. McAndrew, P. Ewing, R. Barclay, S. MacVicar and others, while Scott Elliot has compiled a *Flora of Dumfries*, besides such eminent bryologists as the Rev. J. Ferguson, of Brechin, and Mr. Stirton; and, lastly, our great gratitude is due to Professor Traill, of Aberdeen, who has edited the botanical portion of the *Annals of Scottish Natural History* with exceptional ability, and has himself done good work in the field, besides compiling the various records of Scottish plants in such a manner as enables me to give their present census, so that we can say with some degree of confidence of how many species it is composed. The Scottish flora, as at present known, numbers:—

|                                    |     |     |     |     |     | Species |
|------------------------------------|-----|-----|-----|-----|-----|---------|
| Natives and denizens               | ... | ... | ... | ... | ... | 1,205   |
| Aliens, introductions, and casuals | ... | ... | ... | ... | ... | 285     |
| Total                              |     |     |     |     |     | 1,490   |

The whole of the British species number over 2,000, so that Scotland has practically three-fourths of the plants known to grow in the British Isles. In addition, there are about forty other species awaiting verification, since the records are made on unsatisfactory evidence. Over sixty other species have also been recorded, but it is to be feared in every instance erroneously, and two or three are now probably extinct. The plants peculiar to Scotland are not so numerous as would at first sight be supposed. About eighty only do not reach as far south as England, or west to Ireland; and, besides these, about fifty-seven species, or so-called species, of hawkweeds are also apparently limited to Scotland; but there is great probability that some of these will be found to extend to England or Ireland.

## SPECIES PECULIAR TO SCOTLAND.

|                                           |                                              |
|-------------------------------------------|----------------------------------------------|
| <i>Thalictrum Kochii</i>                  | <i>S. reticulata</i>                         |
| <i>Ranunculus scoticus</i> (? in Ireland) | <i>Pinus sylvestris</i>                      |
| <i>Draba rupestris</i>                    | <i>Polygonatum verticillatum</i>             |
| <i>Arabis alpina</i> (Isle of Skye)       | <i>Juncus trifidus</i>                       |
| <i>Cochlearia groenlandica</i>            | <i>J. castaneus</i>                          |
| <i>Erophila inflata</i>                   | <i>J. biglumis</i>                           |
| <i>Cerastium trigynum</i>                 | <i>J. alpinus</i>                            |
| <i>Arenaria sulcata</i>                   | <i>J. balticus</i>                           |
| <i>A. norvegica</i>                       | <i>Luzula (Juncoides) arcuata</i>            |
| <i>Cherleria sedoides</i>                 | <i>Potamogeton Sturrockii</i>                |
| <i>Sagina Boydii</i>                      | <i>Eriophorum alpinum</i> ( <i>extinct</i> ) |
| <i>S. nivalis</i>                         | <i>Carex rupestris</i>                       |
| <i>S. Linnæi</i>                          | <i>C. helvola</i>                            |
| <i>Lupinus nootkatensis</i>               | <i>C. approximata</i>                        |
| <i>Astragalus alpinus</i>                 | <i>C. alpina</i>                             |
| <i>Oxytropis uralensis</i>                | <i>C. salina var. kattedgatensis</i>         |
| <i>O. campestris</i>                      | <i>C. rariflora</i>                          |
| <i>Lathyrus niger</i>                     | <i>C. vaginata</i>                           |
| <i>Pyrus pinnatifida</i>                  | <i>C. atrofusca</i>                          |
| <i>Saxifraga cernua</i>                   | <i>C. Sadleri</i>                            |
| <i>S. rivularis</i>                       | <i>C. saxatilis</i>                          |
| <i>Erigeron alpinus</i>                   | <i>C. chordorrhiza</i>                       |
| <i>Gnaphalium supinum</i>                 | <i>Hierochloa borealis</i>                   |
| <i>G. norvegicum</i>                      | <i>Deyeuxia strigosa</i>                     |
| <i>Lactuca alpina</i>                     | <i>Phleum alpinum</i>                        |
| <i>Arctostaphylos alpina</i>              | <i>Alopecurus alpinus</i>                    |
| <i>Loiseleuria procumbens</i>             | <i>Poa scotica</i> ( <i>P. laxa</i> )        |
| <i>Phyllodoce taxifolia</i>               | <i>Athyrium flexile</i>                      |
| <i>Ledum palustre</i> (doubtfully native) | <i>A. alpestre</i>                           |
| <i>Moneses grandifolia</i>                | <i>Botrychium matricariæfolium</i>           |
| <i>Primula scotica</i>                    | <i>Hieracium eximium</i> , Backh.            |
| <i>Gentiana nivalis</i>                   | <i>H. calenduliflorum</i> , Backh.           |
| <i>Veronica alpina</i>                    | <i>H. graniticolum</i> , W. R. Linton        |
| <i>V. fruticans</i>                       | <i>H. globosum</i> , Backh.                  |
| <i>Euphrasia scottica</i>                 | <i>H. gracilentum</i> , Backh.               |
| <i>E. foulaensis</i>                      | <i>H. petiolatum</i> , Elfst.                |
| <i>E. latifolia</i>                       | <i>H. atratum</i> , Fr. f.                   |
| <i>Rhinanthus monticola</i>               | <i>H. curvatum</i> , Elfst.                  |
| <i>R. borealis</i>                        | <i>H. Backhousei</i> , F. J. H.              |
| <i>Orobanche cruenta</i> (?)              | <i>H. lingulatum</i> , Backh.                |
| <i>Pinguicula alpina</i>                  | <i>H. senescens</i> , Backh.                 |
| <i>Atriplex calotheca</i> (?)             | <i>H. Marshalli</i> , Linton                 |
| <i>Betula nana</i>                        | <i>H. sinuans</i> , F. J. H.                 |
| <i>B. intermedia</i>                      | <i>H. centripetale</i> , F. J. H.            |
| <i>Salix lanata</i>                       | <i>H. submurorum</i> , Lindb.                |
| <i>S. myrsinites</i>                      | <i>H. hyperarcticum</i> , F. J. H.           |
| <i>S. arbuscula</i>                       | <i>H. callistophyllum</i> , F. J. H.         |

|                                                      |                                   |
|------------------------------------------------------|-----------------------------------|
| <i>H. cerinthiforme</i> , Backh.                     | <i>H. duplicatum</i> , Alm.       |
| <i>H. breadalbanense</i> , F. J. H.                  | <i>H. insulare</i> , F. J. H.     |
| <i>H. langwellense</i> , F. J. H.                    | <i>H. cæcio-murorum</i> , Lindeb. |
| <i>H. clovense</i> , Linton                          | <i>H. orarium</i> , Lindeb.       |
| <i>H. carenorum</i> , F. J. H.                       | <i>H. duriceps</i> , F. J. H.     |
| <i>H. eustales</i> , Linton                          | <i>H. porrigens</i> , Almq.       |
| <i>H. proximum</i> , F. J. H.                        | <i>H. rhomboides</i> , Stenst.    |
| <i>H. oreades</i> , Fr.                              | <i>H. stenophyes</i> , W. R. L.   |
| <i>H. pseudo-onosmoides</i> , Dahlst                 | <i>H. subanfractum</i> , Marshall |
| <i>H. nitidum</i> , Backh.                           | <i>H. angustatum</i> , Lindeb.    |
| <i>H. buglossoides</i> , Arv. Touv.                  | <i>H. subramosum</i> , Lomur.     |
| <i>H. stenopolepis</i> var. <i>anguinum</i> , Linton | <i>H. diaphanoides</i> , Lindeb.  |
| <i>H. aggregatum</i> , Backh.                        | <i>H. lapponicum</i> , Fr.        |
| <i>H. pictorum</i> , Linton                          | <i>H. zelandicum</i> , Beeby      |
| <i>H. rivale</i> , F. J. H.                          | <i>H. truncatum</i> , Lindeb.     |
| <i>H. pollinarium</i> , F. J. H.                     | <i>H. dovreense</i> , Fr.         |
| <i>H. orcadense</i> , W. R. L.                       | <i>H. Dewari</i> , Syme           |
| <i>H. rubiginosum</i> , F. J. H.                     | <i>H. Borreri</i> , Syme          |

The following two plants are only found in Scotland and Ireland:—

*Eriocaulon septangulare*

| *Carex fusca*

### SCOTTISH SPECIES OF PLANTS.

The Scottish species of plants belong chiefly to the Scandinavian type, and are extremely interesting. No one county has them all, but the counties richest are Perth, Forfar, Aberdeen, and Inverness.

On the serpentine of Unst, in the Shetland group, is *Arenaria norvegica*, also found in Sutherland, and a form of *Cerastium arcticum*, both being found by young Edmondstone when a boy of eleven; and these northern islands also have a hawkweed, *Hieracium zelandicum*; a marsh near Thurso has a grass, *Deyeuxia strigosa*; the banks of the River Thurso is one of the two stations known for the Holy Grass; on the coast the beautiful little gem-like flowers of *Primula scotica* are locally frequent, and the eye-bright, *Euphrasia latifolia*, is found. Sutherland has a rich flora, as its fine mountains on the western side yield *Arenaria sulcata* and *A. norvegica*, and its marshes give the only known British locality for *Carex chondorrhiza*.

The island of Skye is the only known Scottish home for the pipewort, *Eriocaulon*, which grows in the shallow margin of

lochs; and the precipitous Cuchullins is the only British habitat for *Arabis alpina*.

Ross-shire yields a variety of *Agrostis canina*, var. *scotica*, which I discovered on Ben Eay, and it is the head centre of *Arctostaphylos alpina*; a bog in the Black Isle is the only known station for *Pinguicula alpina*, and I have recently gathered *Gnaphalium norvegicum*. The great county of Inverness contains the highest mountain—Ben Nevis—and there are extensive marshes and beautiful streams and lochs. It is the head centre of *Saxifraga rivularis*, which grows at the base of the steepest and most elevated cliffs, and of *Cerastium trigynum*; it is the only Scottish home for *Carex fusca*, and one of the three counties which yield *Carex approximata*. On the river banks at Beaully I gathered for the second British station *Carex salina*.

Elgin and Nairn have those Scottish rarities the lovely *Linnaea borealis* and *Moneses uniflora*. Aberdeenshire, with its splendid mountains—Ben Macdhui being only second to Ben Nevis in altitude—is the headquarters of *Luzula arcuata*; it also has the only known locality for the true *Poa scotica* (*P. lara*), *Sagina Boydii*, and *S. alpina*; and it shares with one or two counties only in affording localities for *Gnaphalium norvegicum*, *Lactuca alpina*, *Erigeron alpinus*, *Salix lanata*, *Carex helvola*, *C. approximata*, *C. alpina*, *C. Sadleri*, and *Astragalus alpinus*. Perthshire, with its classic Ben Lawers, on which something like thirty of the plants peculiar to Scotland can be gathered, has two especially interesting species in *Saxifraga cernua* and *S. decipiens* (the latter of which I added to the Scottish flora in the eighties), *Myosotis alpestris*, *Erophila inflata*, *Draba rupestris*, *Sagina nivalis*, *Gentiana nivalis*, *Arenaria sulcata*, *Carex atrofusca*, and others. Perthshire also has the blue heath, *Phyllodoce taxifolia*, on the Sow of Athol, the yellow-flowered *Oxytropis campestris* near Loch Loch, and until recently in a marsh near Loch Tay a variety of *Dryoxia neglecta* named *borealis*, which I found in the eighties, and which is one of the most arctic forms known for Britain; Perth is also the home of *Potamogeton Sturrockii*, possesses the second locality for *Astragalus alpinus*, is the head centre of *Cochlearia miracea* and *Juncus biglumis*, and is the only known Scottish home for *Poa palustris*, *Scheuchzeria*, and *Schœnus ferrugineus*, the two latter nearly, if not quite, extinct.

Argyllshire has some magnificent scenery, and one of its mountains, Ben Laiogh, has many interesting species. On it,

both in Perth and Argyll, I found a large-flowered form of *Arabis petraea*, which I named *grandifolia*; it is allied to, if not identical with, var. *ambigua* of Fries; and the mountain is also rich in hawk-weeds and ferns.

Ayrshire has had *Botrychium matricariaefolium* recorded for it, as well as a peculiar variety of *Veronica officinalis*.

The coast of Wigtown has *Ononis reclinata*, but possibly introduced; *Atriplex calotheca*, the identity of which is not certainly ascertained; and it is the county from whence I first described the variety *hians* of *Melampyrum pratense*.

The county in which we meet comes in the first rank for the number of typical plants which it contains. It was the only home for the alpine cotton-grass. The cliffs of Glen Dole give a list of plants scarcely inferior to Ben Lawers, including *Astragalus alpinus*, *Oxytropis campestris*, *Lactuca alpina*, *Carex rupestris*, and *C. alpina*—plants which are absent from the Perthshire hills. The quartz-veined rocks of Caulochen are scarcely less rich, and they also have *Gentiana nivalis*. The table-land above these glens is the headquarters of *Carex rariflora* and the alpine forms of *C. aquatilis*. It is indeed a pleasure to wander over this elevated table-land, 3,000 feet above sea-level, and to see growing by the mountain rills such plants as *Alopecurus alpinus*, *Phleum alpinum*, and *Sagina Linnæi* with its tiny stars of blossoms, or to traverse the Little Culrannoch to see the rosy spikes of *Lychnis alpina* in its only Scottish home. Then as a complete change we may investigate the rich aquatic vegetation of Rescobie and Restennet to see in one of its few localities the submerged flowers like pearls of the *Ranunculus divaricatus* var. *aspergillifolius*, or the introduced water-soldier *Stratiotes*, or the poisonous *Cicuta*, which is said to lose its poisonous qualities near Edinburgh. The coast with bold cliffs near Montrose is adorned with the beautiful wood-vetch and the purple milk-vetch, and the shingle here and there shows with the beautiful blossoms and foliage of the oyster-plant, while on the rich arenaceous tract of the Sands of Barrie, where *Juncus balticus* and *Carex incurva* grow, an excessively rare form of the moonwort was once found. At Lunan Bay I also discovered for the first time in Scotland a specimen of the Kamskatchan wormwood, *Artemisia Stelleriana*, which probably had been brought by birds from Scania, where it is plentiful as a coast-plant. Thirty-six of the plants peculiar to Scotland are found in Forfarshire, exclusive of the *Hieracia*, which are also richly represented,

## FAUNAL AND FLORAL CONTRASTS IN SCOTLAND.

The contrast between the floral and the human inhabitants of Scotland is strongly marked. The latter can successfully establish themselves not only in Britain, but they form the best colonists the world has ever known. It is not so with the Scottish group of alpine plants, Although it is true that some species of the Scandinavian type are enabled to settle themselves on the mountains of Northern England or Wales, and a still smaller number in Ireland, yet they are comparatively few, and in individual members there is a striking diminution. On the contrary, while Englishmen do poorly north of the Tweed, the plants from Southern Britain extend year by year their northern and western boundary. Railways and agriculture, and even manufacturing and mining operations, assist in this distribution, and this is evidenced by the large number of alien species recorded for Scotland; and a considerable percentage even of those classed as natives or denizens have no very satisfactory claims to be considered as constituents of the aboriginal flora, however naturalized they are now. \*

With such a large proportion of species recorded, and such an accumulation of knowledge about them as exists, the question may be asked, "Is there any reason why further attention should be given to a subject which is practically exhausted?—at any rate, of what use is it to the pharmacist?" To this I may reply that the subject is not worked out. It is true that the comital distribution of species is assuming some degree of completeness, yet how little is known of the geographical or altitudinal range of the minor forms and varieties, and how much it is to be desired that the plants themselves should be carefully correlated with continental forms. Even now more than half the counties of Britain possess no published flora, and their preparation now requires a very much increased labour than was formerly the case. The wide extent of research which plant oecology demands is scarcely as yet brought into the range of our vision, or what is seen is through a glass darkly, so that in this department of science, as yet only in its initial stages, any one of you can bring his quatum of assistance. The curious and suggestive instances of plant-association—that is, the occurrence in many stations of two or more species together, evincing as it does a mutual preference—is a subject which attracted one of your brilliant Scottish students, and it deserves and requires a more complete attention than it has yet received. The scientific exploration of the large



pieces of inland water, such as your beautiful lochs, on the same lines as our Swiss and continental *confrères* have worked upon, should be speedily undertaken.

#### FIELD-BOTANY AND ITS PLEASURES.

It has been somewhat the fashion in certain quarters to depreciate, if not to sneer at, field-botany; but one may be quite sure that there is little justification for this treatment. There is ample room for the laboratory-teacher, who has not only done so much to investigate plant-structure, and has so successfully demonstrated the unity of organic life, but has converted one side of the science into an excellent subject for a professorial course of teaching; and there is full scope for the field botanist—he who comes face to face with Nature in her ever-changing moods, and is able to realize her enormous power of accommodating herself to environment. He is able to appreciate not so much, perhaps, the wind being tempered to the shorn lamb, but how the latter is able to accommodate itself to changed conditions. He notices the various modifications leaf-form assumes under varying conditions—the development of parenchymatous tissue in moist shady situations, and the shrinkage of it in exposed and dry places. He observes that under certain conditions seed-bearing becomes rare or absent, as in such instances as the elm, which propagates itself so readily by suckers, in the sweet flag by the creeping rhizome, or by the rooting stem as in the creeping jenny, and by the disarticulation of the leaflets in the lady's smock. He is able to explain the advance over Britain of certain continental species, such as *Crepis taraxacifolia*, whose feathery fruits are carried on Nature's chariot far and wide; and by the same powerful agent little parachute-like fruits of sea thrift are carried from the coast to the summit of the highest mountains, where they find a home—not, it is true, by the salt sea-foam, but on the rocky cliffs, where, meeting a constantly moist atmosphere and an absence of competing vegetation, they only greet the waves of wind and mist which surge over them from time to time. He is able to suggest in a way no mere armchair or laboratory botanist can, on seeing a piece of ground, what species are likely to grow there, and of what soil the ground is composed, and he is able to estimate with considerable accuracy whether they are native or introduced species which grow there. He is also cognisant of the important influence which a more rapid means of locomotion has exerted on plant-distribution—for in-

stance, the spread of the little toad-flax (*Linaria viscida*) along the iron road—so that, although probably of Eastern origin, it has spread over Britain, and its tiny blossoms have ever been seen on the permanent way in lonely Glen Lyon or western Strath Carron; and he is able to realize the agency of birds in conveying to distant lochs or lonely mountain meres aquatic and other plants, such as the Canadian water-thyme; so that we are not dependent upon geological causes alone to account for the similarity of the vegetation of two opposite coasts when in the winds, waves, or by means of birds, seeds or plants may be quickly transported from one to the other.

#### THE PHARMACIST AS A BOTANIST.

Referring once again to Professor Bentley's address, we agree with his assertion that to the pharmacist the study of botany is strongly to be recommended, not so much as an examination subject, because as now taught for pharmaceutical purposes it is but little more than a mental training, and has lost touch of the practical side; but the subject having been practically abolished from the medical curriculum, it behoves us to fill the place which was so worthily held by the apothecaries of old, since to them in large measure the progress of botany is due—and especially as those who legislate, and those who should initiate legislation, appear to be at one in giving us plenty of leisure by permitting not only our business to be absorbed, but the titles which have been obtained by study to be taken from us by people who have not a shadow of right to adopt them. Like the apothecaries of old, we live straitened lives, but we can increase their brightness by pursuing in our leisure hours a science such as the one I am mentioning; and by recording such interesting facts as Nature from time to time may reveal to us, we may do something to explore a small portion of that vast forest of the unknown by which even in the twentieth century we are surrounded, or lighten to some extent the gloom of ignorance which enshrouds some of Nature's problems, and which even the rays of the electric light have not at present illuminated.

Mr. S. R. ATKINS, J.P., said it was a pleasure for him to be permitted and requested to propose a vote of thanks to the President for his address. It fell to his lot because of the two senior past-presidents, his friend Mr. Groves had gone over to the majority,

and they had the regrettable absence of his friend, Dr. Attfield, regrettable to them because of the cause—his indisposition. It was very fortunate for him that he was permitted to propose this vote of thanks, however imperfectly he might do it. It struck him as a coincidence that they should that day have in the chair a botanist. When the Conference met there in 1867 Professor Bentley was in the chair, and he thought that, in the true apostolical succession of an enthusiastic botanist, Mr. Druce was the man for them. The President was a specialist and a very fine specialist. It was said specialists were sometimes narrow, but his friend was not so. He was also an enthusiast, and they would understand that when he told them he would walk twenty miles to get a specimen, and that, with the unerring instinct of genius, straight over mountains and moors. He had been wonderfully charmed with the address just delivered. His friend was not only a man of science, but he was a humorist. He was a master of refined persiflage and an inimitable master in saying a graceful thing, especially to the ladies, at the right moment in the right manner. His sketch to-day had furnished him with a very large amount of information in his portrait and sketch of that wonderful Scotchman, Don, who was only a type after all of splendid men, born and brought up north of the Tweed, such as Dick, Hugh Miller, and a host of others. Well, they had this delightful address, and he was glad to think that they would have it enshrined in the *Year-Book*, for—especially by those who were specialists in this subject—it would be read with great profit and pleasure. He proposed that the very best, heartiest, enthusiastic thanks be given to the President for his very splendid address.

Mr. CHAS. KERR (Dundee), in seconding the motion, spoke of the great pleasure which he, as a Forfarshire man born and bred, and familiar with many of the places to which the President had referred, had in listening to the address, and he added that he hoped Mr. Druce would be spared for many long days to wander about among their glens and hills.

The vote of thanks having been put to the meeting by Mr. ATKINS, was cordially passed, and the PRESIDENT briefly returned thanks. He also announced the receipt of a cablegram from Professor Remington, in the United States, saying "Hearty greetings."

## LETTERS OF APOLOGY FOR ABSENCE.

Mr. RANSOM intimated apologies for absence from Dr. John Attfield, Mr. G. D. Beggs, Dr. Symes, Mr. E. M. Holmes, Mr. H. W. Gadd, Sir Thomas Robinson, Mr. E. H. Farr, Dr. Jowett, Mr. R. C. Cowley, Mr. Thos. Bateson, Mr. R. Wright, Professor Geddes, Mr. J. L. Ewing, Mr. G. Atkinson, Mr. T. H. W. Idris, Mr. F. Baden Bengier, Mr. D. Turner, Mr. Chas. Umney, Mr. D. Watson, and Mr. H. Kemp.

The PRESIDENT said it was not usual to read letters of apology, but he could not refrain from reading one he had received. It was as follows:—

“WATFORD, HERTS, *August 5, 1902.*

“Dear Mr. President,—Ill-health alone prevents me joining in the Pharmaceutical Conference this year at Dundee. The welcome to that city will be as warm evidently as it was in 1867. The subjects to be considered have great interest for me; the discussions are always enlightening, the address is sure to be good. Then there will be the cheerful gossips, the kindly festivities, the renewal of friendships, and the delightful contemplation of the glories of Nature. How I shall miss them all! Alas, miss also departed friends and companions. The eleventh of the twenty-four past-presidents, I am now the senior one living—for how long I wonder? But the retrospect is gratifying. Since a few of us founded the Conference forty years ago save one, that body has contributed nearly a thousand original researches to pharmacy; while socially the Conference has done much towards removing the jealousies and towards promoting the esteem and respect for each other of pharmacists throughout the United Kingdom. How richly it merits the sympathy and support of every one of our followers of the pharmaceutical calling.—Yours faithfully,

“JOHN ATTFIELD.”

They did not generally engross such letters in their records, but he proposed that the letter he had read should be so engrossed, and that was agreed to.

## RECEPTION OF DELEGATES TO THE CONFERENCE.

Mr. RANSOM then read the list of delegates as follows:—

*Pharmaceutical Society of Great Britain.*—The President, Vice-President, Treasurer, Messrs. Cooper, Gifford, Harrison, Southall, Storrar, Symes, R. Bremridge (Secretary).

*Pharmaceutical Society (North British Branch).*—The Chair-

man and Vice-Chairman, and Messrs. Wm. Beaverly Cowie (Edinburgh), Wm. Cummings (Dundee), David Brown Dott (Edinburgh), Thos. Dunlop (Glasgow), John Hutchison Fisher (Dunfermline), Jas. Pinkerton Gilmour (Glasgow), Claude Francis Henry (Edinburgh), Chas. Kerr (Dundee), Thos. Maben (Glasgow), Donald Mitchell (Inverness), Andrew Naysmith (Arbroath), James Nesbit (Portobello), Alex. Spence (Linlithgow), David Storrar (Kirkcaldy), Alex. Strachan (Aberdeen), and John Tocher (Dumfries).

*Pharmaceutical Society of Ireland.*—Mr. G. D. Beggs (President), Mr. J. T. Bernard (Vice-President), Mr. P. Kelly, Mr. J. Smith.

*Bradford and District Chemists' Association.*—Messrs. Arthur Hanson (President), R. W. Silson (Vice-President), J. Jackson.

*Brighton Association of Pharmacy.*—Mr. Chas. G. Yates and Mr. W. Savage.

*Bristol Pharmaceutical Association.*—Mr. E. F. Young (President), Mr. G. T. Turner (Vice-President), Mr. J. W. White (President Elect), Mr. H. E. Boorne (Hon. Sec.).

*Cambridge Pharmaceutical Association.*—Messrs. E. H. Church and E. S. Peck.

*Dover Chemists' Association.*—Mr. R. M. Ewell.

*Edinburgh Chemists', Assistants', and Apprentices' Association.*—Messrs. W. B. Cowie, Wm. Duncan, J. Rutherford Hill, Albert E. Kelly.

*Forfarshire and District Chemists' Association.*—Messrs. A. B. Anderson, John Anderson, Chas. Cummings, Wm. Doig, D. H. Ferrier, John Gray, John Hardie, John Hodge, Chas. Kerr, Wm. Ramsay, Jas. Russell, John W. Russell (Dundee), Wm. Park, E. Fleming (Broughty Ferry), A. Naysmith and J. Jack (Arbroath), T. I. Peebles, J. H. Thomson (Lochee), A. Davidson (Montrose), T. Harley (Perth), W. R. Kermath (St. Andrews), Miss Ford, Mr. Jas. Ford (Kirkriemuir).

*Glasgow and West of Scotland Pharmaceutical Association.*—Messrs. W. L. Currie (President), T. Dunlop (Secretary), Arthur, Brodie, Riddell, and Sutherland.

*Grimsby and District Chemists' and Druggists' Association.*—Messrs. R. J. Cook, J.P. (President), H. W. Colley (Hon. Sec.).

*North-East Lancashire Chemists' Association.*—Councillor R. Shorrocks.

*Liverpool Chemists' Association.*—Messrs. A. C. Abraham, John Bain, Prosper H. Marsden, T. H. Swinton, E. Evans, jun., Harold Wyatt, jun., R. C. Cowley, T. H. Wardleworth, and C. Symes.

*London Chemists' Association.*—Messrs. Albert Cooper, Feaver Clarke, W. Watson Will.

*London Western Chemists' Association.*—Messrs. J. W. Bowen (Vice-President), W. P. Robinson and F. A. Rogers.

*London Chemists' Assistants' Association.*—Messrs. W. Garsed and C. J. Strother.

*Manchester Pharmaceutical Association.*—Messrs. Grier, Johnstone, Kidd, Kirkby, Pidd, G. T. Smith, and Radcliffe.

*Midland Counties Chemists' Association.*—Mr. A. W. Gerrard.

*Newcastle-on-Tyne and District Chemists' Association.*—Messrs. Geo. Foggan, G. F. Merson, T. Maltby Clague, and J. D. Rose.

*Nottingham and Notts Chemists' Association.*—Mr. A. R. Bennet, F.C.S.

*Oxford and District Chemists' Association.*—Messrs. G. C. Druce, M.A., and H. Mathews.

*Plymouth, Devonport, Stonehouse and District Chemists' Association.*—Mr. C. J. Park.

*Sheffield Pharmaceutical and Chemical Society.*—Messrs. A. R. Fox, F.L.S., G. Squire and G. T. W. Newsholme, F.C.S.

*Chemists' and Druggists' Society of Ireland.*—Messrs. Gibson and Rankin.

Mr. PECK then read the

#### REPORT OF THE EXECUTIVE COMMITTEE.

The Executive Committee beg leave to report to the members of the Conference that they have met in London upon four different occasions, at which a large proportion of the members were present.

Since the last annual meeting 51 candidates have been elected to membership, 37 members have resigned, and 10 have been removed by death. Amongst the latter, special mention must be made of the following:—Mr. William Martindale, who was President of the Conference at Cardiff in 1891 and at Liverpool in 1896, and a frequent attender at other annual meetings. He was Chairman of the Reception Committee when the Conference met in London in 1900. As Chairman of the Formulary Committee for many years he rendered invaluable services, and generously placed at its disposal his exceptional experience in this direction. The *Year-Books* of the Conference contain many original researches in

pharmacy by him. The Committee feel that in him they have lost a brilliant and particularly accurate and conscientious scholar and a loyal and active worker.

Mr T. B. Groves, of Weymouth, was President of the Conference at London in 1874 and Bristol in 1875, and of him it has been said "he was one of the most accomplished men who have shed lustre upon the annals of British pharmacy."

The death also of Mr Louis Siebold, late Editor of the *Year-Book*, whose resignation through ill-health was specially drawn attention to in the last annual report, is now recorded with profound regret.

Mr John Johnston, sen., of Aberdeen, has passed away during the last month. He took a keen interest in pharmaceutical affairs, and was much respected and esteemed by all who met him at the many meetings of the Conference which he attended.

The research list has been again revised by a sub-committee appointed for the purpose. Several deletions of subjects recently worked out were made, whilst other items were added.

The Committee wish to draw special attention to the fact that a considerable sum of money is available for the purposes of research, and they would heartily welcome applications for grants.

Your Committee wish to thank the various local corresponding secretaries for the help they have rendered in collecting and forwarding subscriptions from members in arrears and otherwise assisting in keeping the list of members fairly accurate.

The Committee would be glad to receive the names of members willing to serve as local corresponding secretaries in those towns where at the present no one is acting in that capacity. They feel that this would be one means of considerably increasing the membership of the Conference.

Your Committee also desire to tender their hearty thanks to the Pharmaceutical Society of Great Britain for their kindness in granting them the use of a room for their meetings at 16, Bloomsbury Square, London.

The following have been duly elected honorary members of the Conference, and have written expressing their thanks —

Mr C. R. Blackett, President of the Pharmacy Board, Melbourne

Prof Ladenburg, of the University of Breslau

Mr J. H. Maiden, Director of the Botanic Gardens, Sydney

Dr. David Prain, Director of the Botanical Survey, Calcutta

Prof. Prescott, of the University of Michigan, Ann Arbor, U.S.A.

Mr. W. T. Grice, F.C.S., of Calcutta, has been appointed Colonial Secretary for Bengal.

Mr. J. O. Braithwaite, the Editor of the *Year-Book*, reports that good progress is being made, and that the MSS. of Parts 1 to 3 are already in the hands of the printers.

Mr. N. H. MARTIN moved the adoption of the report. He thought they would agree with him that, on the whole, the work of the Executive had been of an exceedingly satisfactory character, and that the Conference was doing the good work which its originators and promoters always held it would accomplish. The report was longer than usual on account of the reference to the losses they had suffered through death, and especially with reference to the death of his friend Mr. Groves. He had done his work, which would live as long as pharmacy lived, and although his friends parted from him with regret, it was in the ordinary nature of things, for he had reached the three-score years and ten. They would remember him with affectionate regret, not only on account of his work in the cause of truth, but also because of his charming personality. But the greatest and most deplorable loss of all was that of their friend Mr. Martindale. Those of them who had worked with him—and he had worked with him intimately—deplored his death very much at his early age. He had accomplished a colossal work in his life-time, which a man a quarter of a century older might have looked forward to with satisfaction, and the work he did was an earnest of more work he would have done had he lived longer. Referring to the report, he said it was a matter of some regret that the small amount of money which there was for research purposes was not applied for. He did think some of the younger members of the Conference should take this matter to heart. The president had alluded to the fact that they were not as a body exceedingly wealthy, but some of the younger members might apply for some of this money and use it for the purposes for which it was available. He hoped before next year that would be done. The report, on the whole, was satisfactory, and with such a President and such addresses as they had listened to at Dublin and that day he felt sure the future of the Conference would be greater and more glorious than it had been in the past.

Mr. J. C. C. PAYNE seconded the motion.

Mr. ATKINS said he was privileged to support this resolution



because he wished to have an opportunity of saying one word about his lifelong friend Mr. Groves. They were friends from boyhood; they were apprenticed together in the same town, at the same time, and all through their lives they had had unbroken and uninterrupted friendship, and he had lost through the death of Tom Groves one of his best and dearest friends. Groves belonged to a body of men who, he would say, constituted the renaissance of pharmacy. It was perilous and invidious to select names, but Schacht, Reynolds, Brady, Stoddart, and Groves were a galaxy of stars. Groves was a true man and a keen observer, an accurate thinker and an efficient worker in pharmacy, and always up to date. His work would stand the test of all time. The investigation of his work would be a work for research—that was to say, research workers would turn to Groves' work, and find there a mine in which they might dig and bring valuable ore to the surface. Groves was more than a pharmacist and chemist—he was a great archæologist, and wonderfully gifted as an antiquarian. He referred to the work which, along with the Rev. W. H. Moule, brother of the Bishop of Durham, and Barratt, with regard to the archæology of Weymouth, as a colossal work, in which Mr Groves was practically working co editor.

#### THE FINANCIAL STATEMENT.

The TREASURER (Mr. John C. Umney) submitted the financial statement (see p. 374), and, in referring to the arrears of subscriptions, he mentioned that on the last occasion when the meeting was in Dundee the treasurer reported the arrears for the four previous years, but now they left them out. They would be glad to have those subscriptions paid up by the time of the next Conference, wherever it might be, and he felt sure the balance would then be as much on the right side as the deficit was now.

Mr. GERRARD moved the adoption of the statement.

Mr. J. RUTHERFORD HILL seconded the motion. He was glad to see the finances were in such a healthy condition. Speaking from personal experience as to arrears, he said it was a very easy thing indeed to forget a subscription. The arrears might be due to the peripatetic nature of the Conference. One expected a certain amount of joining and lapsing. But the local enthusiasm kept it going on from year to year, so that its peripatetic nature was a valuable feature of it. He believed the Conference had a great future before it.

## FINANCIAL STATEMENT FOR THE YEAR ENDING JUNE 30, 1902.

*The Hon. Treasurer in Account with the British Pharmaceutical Conference.*

| 1901.    | Dr.                                         | £ s. d.  | £ s. d.   |
|----------|---------------------------------------------|----------|-----------|
| July 1   | To Assets forward from last year.—          |          |           |
|          | „ Cash in Secretary's hands—                |          |           |
|          | Petty Cash . . . .                          | 8 1 1    |           |
|          | „ Cash at Bank . . . .                      | 18 10 0  |           |
|          |                                             | <hr/>    | 21 11 4   |
| 1902.    | „ Sales of <i>Year-Book</i> —               |          |           |
|          | By Publishers . . . .                       | 18 6 8   |           |
|          | By Secretary . . . .                        | 6 7 6    |           |
|          |                                             | <hr/>    | 21 14 2   |
|          | „ Advertisements in <i>Year-Book</i> , 1900 | 0 12 0   |           |
|          | „       „       „       1901                | 67 6 6   |           |
|          |                                             | <hr/>    | 67 18 6   |
|          | „ Sales of Formulary—                       |          |           |
|          | By Publishers . . . .                       | 14 0 0   |           |
|          | „ Members' Subscriptions                    | 350 13 8 |           |
|          | „ Liabilities—on open Accounts              |          |           |
|          | Butler & Tanner . . . .                     | 34 15 1  |           |
|          | Due Assistant-Secretary for                 |          |           |
|          | Salary and Rent for Quarter                 |          |           |
|          | ending June 30 . . . .                      | 13 15 0  |           |
|          | For Postages and Petty Cash                 | 6 18 0   |           |
|          |                                             | <hr/>    | 53 8 4    |
|          | „ Bell and Hills Fund . . . .               |          | 27 18 8   |
|          | „ Asset on last year's Account              |          |           |
|          | since realized—J. & A. Churchill            |          | 96 1 1    |
|          |                                             |          | <hr/>     |
|          |                                             |          | £658 11 4 |
| 1901.    | Cr.                                         | £ s. d.  | £ s. d.   |
| July 1   | By Bell & Hills Fund, forward from          |          |           |
|          | last year . . . .                           |          | 28 11 0   |
| 1902     |                                             |          |           |
| June 30. | By Expenses of <i>Year-Book</i> , 1901 —    |          |           |
|          | Printing, Publishing and                    |          |           |
|          | Binding . . . .                             | 196 0 4  |           |
|          | Banding and Parcelling . . . .              | 3 2 6    |           |
|          | Postages and Distributing . . . .           | 16 3 4   |           |
|          | Advertising, Publishers'                    |          |           |
|          | Charges, and Commission . . . .             | 18 5 2   |           |
|          | Electros . . . .                            | 0 15 0   |           |
|          | Editor's Salary . . . .                     | 100 0 0  |           |
|          |                                             | <hr/>    | 334 6 4   |
|          | „ Expenses of Formulary:—                   |          |           |
|          | Printing and Composing 1,500                | 29 6 0   |           |
|          | Banding and Parcelling . . . .              | 3 11 11  |           |
|          | Printing and Composing 500 . . . .          | 9 17 6   |           |
|          | Publishers' Charges, £1 9s.,                |          |           |
|          | Advertising, 14s. . . .                     | 2 3 0    |           |
|          |                                             | <hr/>    | 44 18 5   |

| 1902.    | CR.                                                   | £   | s. | d. | £    | s. | d. |
|----------|-------------------------------------------------------|-----|----|----|------|----|----|
| June 30. | By Sundry Expenses :—                                 |     |    |    |      |    |    |
|          | C.W. Gibbs & Son, Programmes                          | 1   | 11 | 6  |      |    |    |
|          | Assistant-Secretary at Annual Meeting                 | 10  | 0  | 0  |      |    |    |
|          |                                                       |     |    |    | 11   | 11 | 6  |
|          | „ Assistant-Secretary's Salary for 1 year to date     | 45  | 0  | 0  |      |    |    |
|          | Rent of Office for 1 year to date                     | 10  | 0  | 0  |      |    |    |
|          |                                                       |     |    |    | 55   | 0  | 0  |
|          | Postages (including 2 years' annual circulars)        |     |    |    | 14   | 11 | 6  |
|          | „ Printing and Stationery :—                          |     |    |    |      |    |    |
|          | McCorquodale & Co.                                    | 9   | 6  | 6  |      |    |    |
|          | Ash & Co.                                             | 0   | 17 | 6  |      |    |    |
|          |                                                       |     |    |    | 10   | 4  | 0  |
|          | „ Petty Cash. Secretary                               | 10  | 10 | 10 |      |    |    |
|          | Editor                                                | 0   | 10 | 8  |      |    |    |
|          |                                                       |     |    |    | 11   | 1  | 6  |
|          | „ Bank Charges, 1d., Commission on Postal Orders, 3d. |     |    |    | 0    | 0  | 4  |
|          | „ Liabilities of last year, since paid :—             |     |    |    |      |    |    |
|          | Butler & Tanner                                       | 121 | 12 | 6  |      |    |    |
|          | McCorquodale & Co.                                    | 2   | 4  | 0  |      |    |    |
|          | Assistant Secretary                                   | 13  | 15 | 0  |      |    |    |
|          |                                                       |     |    |    | 137  | 11 | 6  |
|          | „ Foreign Journals for Editor                         |     |    |    | 4    | 14 | 10 |
|          | „ Balance at Bank                                     |     |    |    | 5    | 19 | 8  |
|          |                                                       |     |    |    | £658 | 11 | 4  |

*The Bell and Hills Fund.*

| 1901.    |                                                   | £     | s. | d. | £  | s. | d. |
|----------|---------------------------------------------------|-------|----|----|----|----|----|
| July 1.  | To Balance from last year                         | 28    | 11 | 9  |    |    |    |
| 1902.    |                                                   |       |    |    |    |    |    |
| June 30. | „ One Year's Dividend on Consols                  | 9     | 6  | 8  |    |    |    |
|          |                                                   |       |    |    | 37 | 18 | 5  |
| July 24. | Paid Henry Kimpton for Books                      |       |    |    | 9  | 19 | 9  |
|          |                                                   |       |    |    | 27 | 18 | 8  |
|          | „ Assets :—                                       |       |    |    |    |    |    |
|          | In account with British Pharmaceutical Conference | 27    | 18 | 8  |    |    |    |
|          | £360 2½% Consolidated Stock,                      | £360. |    |    |    |    |    |

*The British Pharmaceutical Conference Research Fund.*

| 1901.   |                           | £  | s. | d. |
|---------|---------------------------|----|----|----|
| July 1. | To Balance from last year | 47 | 5  | 0  |

Examined and found correct,

July, 1902.

G. H. GRINDLEY, }  
JAMES RUSSELL, } Auditors.

The Reports of the Executive Committee and of the Treasurer were then unanimously adopted.

#### REPORT OF FORMULARY COMMITTEE.

Mr. N. H. MARTIN read the report of the Formulary Committee, as follows:—

At the last meeting of the Conference in Dublin the Formulary Committee reported the publication of the new edition of the *Formulary*. Since then a steady demand for the book has been maintained, and the sum of £14 realized from the sale of it. This is quite satisfactory, as indicating that the number of prescribers who accept the *B.P.C. Formulary* as the standard for the preparations contained in it are on the increase. There are still some copies on hand at the printers, but it is time to consider seriously the question of the early revision of the book, with such alterations and additions as may be found necessary, and in this connexion the Committee is much disappointed that no notice has been taken of the request in the last report that members of the Conference should send to the Secretary, or to any member of the Formulary Committee, a list of all preparations which they found occurring in prescriptions and for which there was no formula in the *Pharmacopœia* or the *Formulary*. There must be a considerable number of such preparations which do not come under the personal experience of the dozen members of the Committee, and it is only by every member of the Conference acquainting the Committee wherein he has found the *Formulary* wanting that it can be made as complete as desirable. The Committee hopes that this reminder will have the effect of inducing members of the Conference to send in with as little delay as possible the material for compiling such a list as will enable the Committee, if reappointed, to give early consideration to whatever revisional or supplementary work on the subject may be found necessary.

This report was received, and the reading of the papers communicated to the Conference was then proceeded with. The first paper read was on

## ALKALOIDAL STABILITY OF CERTAIN STANDARDIZED PREPARATIONS OF THE BRITISH PHARMACOPŒIA.

BY W. A. H. NAYLOR, F.I.C., F.C.S. AND C. HUXTABLE.

Various statements have been made from time to time concerning the variation in alkaloidal content of standardized preparations, due to the length of time that they have been kept in stock.

Liquid extract of ipecacuanha is a preparation about which much diversity of opinion exists, as will be seen by the following published statements:—

R. Globe Guyer, in a paper on the B.P. preparations of ipecacuanha (*vide Pharm. Journal* [4], 9, 622), affirms that a remarkable reduction in the strength of the liquid extract takes place after being kept in stock two months. He indicates a diminution of 0.552 per cent., viz., from 2.08 to 1.528 per cent. This corresponds to a loss of 26.53 per cent. on the amount of alkaloid originally present.

In contradiction to this there is a paragraph under "Annotations" (*Pharm. Journal* [4], 9, 633), stating that a sample of liquid extract which had been kept in stock for eighteen months remained still bright, and contained the full amount of alkaloid.

J. W. Thomson, in a short article on liquid extract of ipecacuanha (*Pharm. Journal* [4], 10, 54), notes that a laboratory sample of a 12-gallon lot made six months previously showed no signs of deterioration. On examination it indicated the same alkaloidal value as when made, viz., 2.1 per cent.

J. C. Umney, in a paper entitled "A Few Difficulties of the Pharmacopœia," under the heading "Ipecacuanha," states that deterioration takes place in the alkaloidal value of the liquid extract, and even more deterioration in the wine (*Pharm. Journal* [4], 10, 8).

These conflicting statements have induced us to make a series of determinations of liquid extract of ipecacuanha and certain other standardized preparations with the object of ascertaining their degree of stability in respect to alkaloidal content.

Farr and Wright, in their "Note on the Stability of Alkaloidal Tinctures" (*Year-Book of Pharmacy*, 1894, p. 344), show that an appreciable loss of alkaloid is noticeable in tincture of cinchona. The preparations we have examined are:—

- (a) Liquid extract of cinchona.
- (b) Tincture of cinchona.
- (c) Compound tincture of cinchona.

(d) Liquid extract of ipecacuanha.

(e) Liquid extract of nux vomica.

The respective samples were taken from large batches which had been recently made. They have been kept under observation from November, 1901, until July, 1902, requisite quantities being withdrawn and assayed at intervals of one month. The method of storage has been simply to leave them on a shelf, in ordinary stoppered bottles, exposed to variations of light and temperature under exactly similar conditions as would obtain in an ordinary pharmacy. The official processes of assay have been employed in all cases, with the exception of liquid extract of ipecacuanha, where Naylor and Bryant's process has been used.

The following table shows the results obtained :—

|                                     | 1901                   |                         | 1902.                  |                         |                         |
|-------------------------------------|------------------------|-------------------------|------------------------|-------------------------|-------------------------|
|                                     | Nov.                   | Dec.                    | Jan.                   | Feb.                    | March.                  |
|                                     | Grammes<br>Per 100 c.c | Grammes<br>Per 100 c.c. | Grammes<br>Per 100 c.c | Grammes.<br>Per 100 c.c | Grammes.<br>Per 100 c.c |
| Liquid Extract of Cinchona .....    | 5.1                    | 5.1                     | 5.1                    | 5.05                    | 5.05                    |
| Tincture of Cinchona .....          | 1.03                   | 1.03                    | 1.02                   | 1.02                    | 1.01                    |
| Compound Tincture of Cinchona ..... | 0.51                   | 0.51                    | 0.51                   | 0.51                    | 0.50                    |
| Liquid Extract of Ipecacuanha ..... | 2.10                   | 2.10                    | 2.05                   | 2.04                    | 2.02                    |
| Liquid Extract of Nux Vomica .....  | 1.50                   | 1.50                    | 1.50                   | 1.49                    | 1.49                    |

|                                     | 1902                    |                          |                         |                         |
|-------------------------------------|-------------------------|--------------------------|-------------------------|-------------------------|
|                                     | April                   | May.                     | June.                   | July.                   |
|                                     | Grammes<br>Per 100 c.c. | Grammes.<br>Per 100 c.c. | Grammes.<br>Per 100 c.c | Grammes<br>Per 100 c.c. |
| Liquid Extract of Cinchona .....    | 5.00                    | 5.00                     | 5.00                    | 5.00                    |
| Tincture of Cinchona .....          | 1.01                    | 1.01                     | 1.01                    | 1.01                    |
| Compound Tincture of Cinchona ..... | 0.50                    | 0.50                     | 0.50                    | 0.50                    |
| Liquid Extract of Ipecacuanha ..... | 2.00                    | 2.00                     | 2.00                    | 1.98                    |
| Liquid Extract of Nux Vomica .....  | 1.49                    | 1.49                     | 1.48                    | 1.48                    |

From this table the loss on the total amount of alkaloid originally present can be calculated, and the figures obtained are shown in the following table :—

|                               | Per Cent |
|-------------------------------|----------|
| Liquid Extract of Cinchona    | 1 96     |
| Tincture of Cinchona . . .    | 1 94     |
| Compound Tincture of Cinchona | 1 96     |
| Liquid Extract of Ipecacuanha | 5 66     |
| Liquid Extract of Nux Vomica  | 1 33     |

As will be noticed, the extreme limit of loss occurs with the extract of ipecacuanha, which amounts to 5 66 per cent., which, however, does not confirm the 26·53 per cent. loss as stated in R. Glode Guyer's paper. The results of the cinchona preparations show practically a constant quantity, viz., 1·96, 1·94, and 1·96 respectively. These amounts are less than that obtained by Farr and Wright in their assay of tincture of cinchona, which amounted to 2·66 per cent. These results show that, with keeping, a depreciation in alkaloidal value of these standardized galenical preparations occurs, although the amount is very small. Farr and Wright, in their comment on the loss of alkaloid in tincture of cinchona, explain that it is doubtless due to the mechanical carrying out of solution of traces of alkaloid by deposition of resinous and extractive matter, and we think that this explanation holds good for other preparations, as in the case of extract of ipecacuanha, where the deposit is apt to be comparatively large. From the deposit from 200 c.c. of the liquid extract which had been allowed to stand for nine months 0·008 gramme of alkaloid was obtained. Examination of the deposits from the other preparations did not yield a weighable quantity. The indications are distinctly in favour of loss of alkaloid by precipitation as opposed to loss of alkaloid by decomposition.

The discussion on the above took place after reading the following paper.

In the absence of the authors, Mr. Ransom then read the following paper :—

## THE STANDARDIZED TINCTURES AND IPECACUANHA WINE OF THE BRITISH PHARMACOPŒIA.

## A REPORT ON THE STRENGTH OF COMMERCIAL SAMPLES.

BY E. H. FARR, F.C.S., AND R. WRIGHT, F.C.S.,

*Pharmaceutical Chemists.*

In the year 1895 we obtained and examined a number of samples of the alkaloidal tinctures of the 1885 Pharmacopœia, and presented a report on the same to the Bournemouth Conference.<sup>1</sup> The wide variation in the alkaloidal value of commercial samples shown in that report was held to constitute a powerful argument in favour of their standardization. In the interval the present edition of the Pharmacopœia has been issued, and the list of standardized preparations extended, and it was thought that the members of this Conference would be interested in a further report on the subject, showing whether the improvement in the processes, was reflected in the character of the resulting products, as met with in pharmacy.

For the purpose of our experiments a number of samples were obtained through the kind instrumentality of friends in different parts of the United Kingdom, and submitted to examination as to (1) alkaloidal strength, (2) extractive value, and (3) specific gravity.

In the determination of the alkaloids the official processes were followed in all cases, but in the strychnine estimations a modification of the official process was employed, based upon our note on the subject read at the London meeting of Conference.<sup>2</sup> This consists in carrying out the precipitation of the alkaloid at a temperature of 70°F., and subsequently washing at 100°F., the necessary correction being made for strychnine lost in the process.

In the note referred to we showed that the official process was liable, under certain conditions, to give results much too high, and this will account for the fact that the figures recorded in the tables accompanying the present note are lower than might have been expected.

The other tinctures do not call for any special comment. One sample of belladonna was evidently a leaf tincture, and in the

<sup>1</sup> *Year-Book of Pharmacy*, 1895, p. 325.

<sup>2</sup> *Year-Book of Pharmacy*, 1900, p. 440, *et seq.*



TABLE I—*Showing the Weight of Alkaloid in Grammes from 100 c c of Tincture.*

| Tincture           | B P Standard   | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | Variation 1885                       |
|--------------------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------------------------------|
| Belladonna         | 0.048 to 0.052 | 0.015 | 0.052 | 0.046 | 0.046 | 0.045 | 0.044 | 0.041 | 0.026 | 0.044 | 0.049 | 0.008 to 0.031                       |
| Cinchona           | 0.95 to 1.05   | 1.00  | 0.92  | 1.00  | 1.16  | 0.58  | 0.90  | 0.95  | 1.02  | 1.01  | 0.98  | 0.22 to 1.18                         |
| Cinchona Compounds | 0.45 to 0.55   | 0.61  | 0.45  | 0.41  | 0.20  | 0.52  | 0.31  | 0.49  | 0.54  | 0.50  | 0.56  | —                                    |
| Nux Vomica         | 0.24 to 0.26   | 0.252 | 0.242 | 0.192 | 0.224 | 0.160 | 0.194 | 0.248 | 0.200 | 0.212 | 0.232 | [alkaloid<br>0.141 to 0.224 Total Al |
| Opium              | 0.70 to 0.80   | 0.71  | 0.83  | 0.76  | 0.77  | 0.65  | 0.69  | 0.67  | 0.70  | 0.74  | 0.76  | 0.908 to 1.12                        |
| Ipecacuanha Wine   | 0.100 to 0.112 | 0.104 | 0.066 | 0.080 | 0.090 | 0.090 | 0.076 | 0.124 | 0.106 | 0.086 | 0.172 | —                                    |

TABLE II—*Showing the Weight of Extract in Grammes from 100 c c of the Tincture (dried at 100°C)*

| Tincture           | Sugres ed Stan<br>(Gidd) | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8    | 9    | 10   |
|--------------------|--------------------------|-------|-------|-------|-------|-------|-------|-------|------|------|------|
| Belladonna         | 0.5 to 2.0 per cent      | 1.158 | 0.748 | 0.728 | 1.146 | 0.916 | 0.852 | 0.730 | 1.10 | 0.95 | 1.05 |
| Cinchona           | 4.0 to 7.0               | 6.23  | 5.65  | 6.67  | 5.88  | 4.50  | 6.51  | 6.95  | 8.90 | 9.50 | 5.50 |
| Cinchona Compounds | 4.0 to 6.0               | 3.21  | 3.42  | 3.78  | 2.85  | 5.20  | 4.30  | 6.00  | 5.85 | 5.05 | 5.50 |
| Nux Vomica         | 1.0 to 2.0               | 3.98  | 2.08  | 2.77  | 2.98  | 2.17  | 1.87  | 1.55  | 1.85 | 3.40 | 3.15 |
| Opium              | 3.0 to 6.0               | 3.47  | 4.33  | 3.75  | 4.12  | 2.54  | 3.37  | 3.55  | 3.30 | 4.15 | 3.50 |
| Ipecacuanha Wine   |                          | 3.25  | 3.87  | 3.64  | 3.98  | 3.26  | 3.23  | 3.90  | 2.50 | 9.05 | 7.60 |

TABLE III—*Showing the Specific Gravity of the Tinctures at 60°F*

| Tincture           | Standards P of | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    |
|--------------------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Belladonna         | 0.912 to 0.918 | 0.930 | 0.920 | 0.918 | 0.918 | 0.918 | 0.917 | 0.911 | 0.941 | 0.915 | 0.915 |
| Cinchona           | 0.916 to 0.920 | 0.923 | 0.934 | 0.912 | 0.931 | 0.928 | 0.926 | 0.915 | 0.925 | 0.925 | 0.914 |
| Cinchona Compounds | 0.912 to 0.918 | 0.928 | 0.920 | 0.935 | 0.904 | 0.909 | 0.915 | 0.914 | 0.925 | 0.924 | 0.920 |
| Nux Vomica         | 0.909 to 0.912 | 0.904 | 0.899 | 0.916 | 0.912 | 0.907 | 0.917 | 0.891 | 0.909 | 0.913 | 0.915 |
| Opium              | 0.932 to 0.958 | 0.960 | 0.945 | 0.963 | 0.963 | 0.956 | 0.956 | 0.958 | 0.955 | 0.958 | 0.954 |
| Ipecacuanha Wine   |                | 0.987 | 0.991 | 0.991 | 0.991 | 0.991 | 0.989 | 0.959 | 0.988 | 1.00  | 1.00  |

case of one or two other tinctures it was quite evident that no attempt at standardization had been made.

The proportion of extractive was ascertained by evaporating a measured quantity of the sample in a tared dish having a flat bottom, and drying the resulting extract at 100°C. until the weight was constant.

The figures for extractive, as might be expected, show a much greater variation than those for alkaloids, in fact the proportion yielded by some of the tinctures is so great as to place them quite outside the limits laid down by the various authorities on the subject.

The sum-total of our results go to show that although the standardization of the preparations submitted to examination has not yet secured that perfect uniformity in strength which is desirable, it has certainly brought about an immense improvement in their character and potency.

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Mr. F. C. J. BIRD referred to the useful character of the experiments which the authors had carried out, particularly in regard to liquid extract of ipecacuanha, as they had examined the samples at stated intervals, so that one could see exactly what amount of change took place. Only last week he had seen three analyses of ipecacuanha wine which had been kept in stock two years, and the quantities of alkaloid found were 0.1, 0.105, and 0.096, which showed a very slow diminution in the strength indeed. He thought, however, there were certain cases in which decomposition might take place, and the cause was to be looked for in the character of the liquid extract. In the Pharmacopœia process lime was employed. Under certain conditions it was quite possible to get a liquid extract either neutral or slightly alkaline, and holding free alkaloid in solution. Under such circumstances decomposition might take place, on keeping and exposure to light, but the authors were quite right in saying that precipitation generally accounted for the loss. He thought an improvement might be worked out by which the use of lime might be avoided in the B.P. formula. He thought it should go forth from the Conference that before any absolute standard of percentage of total solids, etc., could be laid down for the quality of preparations a great deal more work must be done, especially in view of the attitude which analysts took up, and he thought analysts should be a little more careful before they judged samples by standards incompletely worked out.

Mr. J. C. UMNEY, as one of the originators of the B.P. process for liquid extract of ipecacuanha, said he had made a considerable number of experiments, and at first did not observe any deterioration in the extract; but during the past two years he had observed a considerable amount of depreciation—as much as 7 per cent. of the alkaloid present originally. The depreciation was greater in the wine, owing to precipitation. In one instance the liquid extract had suffered no change in three months, while another sample in the same time lost 7 per cent. of alkaloid, owing, as Mr. Bird had said, to excessive alkalinity due to the lime employed.

Mr. MARTIN said that papers of this kind were extremely important in setting up the Pharmacopœia. It was very hard for a pharmacist to make a liquid extract to the full standard and to keep it on the shelf and find it deteriorating. He believed the greatest amount of change occurred in the strongest preparation. It was bad pharmacy to make a very concentrated liquid preparation of organic substances. He advocated the prosecution of such experiments, so that the Pharmacopœia Committee might not make any more mistakes and save them from being handed over to the tender mercies of the public analyst.

Mr. RUTHERFORD HILL said his experience with belladonna and nux vomica preparations was that they were apparently more stable than those of ipecacuanha. He gave an instance where, upon a re-examination of ipecacuanha wine which had been standardized two years before, it had lost apparently about 23 per cent. of the original alkaloid. Something must be allowed for the quality of the wine employed in preparing ipecacuanha wine. Judging by his experience, pharmacists throughout the country either did not know good sherry wine or did not apply any stringent test to it. All kinds of substances were employed under the name of sherry wine, and they found that in various preparations a precipitate was formed after those wines had stood for a time. He thought the loss was due to precipitation, and that the greatest attention should be given to the quality of the wine employed in making galenical preparations.

Mr. WILLIAM MAIR, referring to Mr. Martin's remarks on concentration of vegetable preparations, said his objections could be met by not concentrating to the decomposition-point.

Mr. BIRD asked if Mr. Naylor had found the alkaloid in the deposit balance the loss from the solution.

Mr. MABEN endorsed what Mr. Rutherford Hill had said, and

thought the reduction in strength was more due to the tannin in the wine than anything else.

Dr. COULL spoke of the difference in the colour of extract of belladonna which he produced in following the B.P. formula from that of other people. That was a very important point, because he had had complaints about it, and if there was a process given in the Pharmacopœia it should be strictly adhered to. He was positive it was not adhered to by several people, and it put those who tried to do the right thing in a false position. Another point with regard to ipecacuanha was that he had found in trying to recover some spirit from the liquid extract the spirit had a distinctly fishy odour, due, he believed, to trimethylamine or some such preparation. Was it not possible that might be the cause of precipitation?

Mr. J. C. UMEY said there was an enormous difference in the two belladonnas, and the English root gave the darker preparation quite apart from overheating. The presence of trimethylamine in the ipecacuanha percolate was noted in his original paper.

Mr. MABEN remarked that it might be inferred from what Mr. Umev said that Dr. Coull used foreign root. As to that, he knew one make in which only foreign root was used, there being insufficient of the English to supply the world, and that was a light preparation.

Mr. GERRARD said the central point of value of these papers was that there was not any great extent of deterioration in the alkaloidal value of the preparations, and the papers further demonstrated that, since his early days, pharmacy had made some advance, which was very largely due to the good influence of the Conference. They could not expect to get absolutely unchangeable preparations when they were dealing with crude drugs, and that should teach the public analyst that he should consider fairly the point when he was giving his certificate.

Mr. KERR gave his experience with tinct. cinchonæ co., in which there was sometimes a deposit after standing a little. He had tried several ways of rectifying it, and the question came up when they were dispensing it whether it should be filtered or not. He thought chemists should mark on the prescription whether the mixture had been filtered, so as to prevent the next chemists from getting into trouble.

Mr. WATSON-WILL said he was accustomed in making ipecacuanha wine to first detannate the wine with hide powder. In his experience the resulting preparation kept well under all conditions.

The PRESIDENT, summing up the discussion, remarked that the authors of the papers showed that there was not much diminution of strength in the preparations. As to ipecacuanha, he said that in two instances he knew of, the use of ipecacuanha had been given up altogether, and the persons made an acetous extract which they used instead, and it was a more powerful emetic. Whether the price had anything to do with it he did not know. The gentlemen who had prepared the papers were deserving of very warm thanks.

Mr. NAYLOR said they proposed to keep these preparations. They had only had them nine months, and they would be examined monthly for the next twelve months. He had been very much gratified with the discussion. There was one gentleman present who could tell them more on this subject than any one else—Dr. Paul. He could enlighten them in regard to the question of decomposition. Reference had been made to the action of lime, which they knew under certain conditions had a destructive action upon one of the alkaloids of ipecacuanha, and he had a strong conviction that Dr. Paul could tell them whether there was any probability that liquid extract of ipecacuanha wine, kept in the presence of what no doubt would be a very weak solution of lime, would be likely to decompose. He (Mr. Naylor) had also been asked if the amount of alkaloid found in the precipitate of ipecacuanha liquid extract made up for the deficiency, because if so there could not possibly have been any decomposition. That was a very difficult matter to determine, because it was almost impossible so to treat the sediment as not to lose some of the alkaloid. How would they treat it so that they would be able to recover the whole of it? They had tried it in one case, but the alkaloid obtained did not make up the balance. He was still strongly of opinion, and he thought probably that further experiments would confirm it, that decomposition did not take place to any serious extent in the keeping of these preparations over prolonged periods.

Dr. PAUL said he fully agreed with the conclusions of Mr. Naylor that there was practically no alteration in preparations of cinchona and ipecacuanha if they were properly made and kept: but there might be some reduction in the medicinal value, owing to deposition. With cinchona there was always a very large deposit according to the kind of bark used. That was due to the alteration of that unknown quantity, called extractive or tannin, etc.; but so far as he had had any opportunity of examining it, it con-

tained very little alkaloid. It made a great show, as Mr. Kerr said, and might lead to the supposition that the preparation was considerably altered, from the magnitude of the deposition. As to the alteration due to alkaloid carried down with it, that was exceedingly small. He had in his laboratory some ipecacuanha wine made two or three years ago. He had repeatedly tested it; and it was now practically of the same value as it was when it was made. As to the probability of ipecacuanha preparations becoming weaker he had no doubt if they were made in such a way as to render the spirit or medium, whatever it was, alkaline, then the alteration would be very rapid and very considerable. With regard to the influence that might be exercised by tannic acid in the wine on preparations, that point had been attended to, and Dr. Wild and he had come to the conclusion that a solution of an emetine salt in plain spirit, made about the same alkaloidal strength as ipecacuanha wine, would be much better to use.

The PRESIDENT said the Conference was much indebted to Dr. Paul for his remarks.

The following paper was then read :—

#### NOTE ON AROMATIC SULPHURIC ACID.

BY LEONARD DOBBIN, PH.D.

Some time ago my attention was arrested by a remark made by Atfield respecting aromatic sulphuric acid (*vide* his *Manual of Chemistry*, 17th edition, p. 367), that it has been stated that in this preparation the sulphuric acid and the alcohol form some sulphovinic acid, but that he has been unable to detect the latter acid. In view of the tolerably rapid formation of sulphovinic acid by the interaction of sulphuric acid and alcohol when heat is applied to a mixture of these substances in about equal proportions by volume, and also of what we know concerning its gradual formation when the same materials are mixed slowly (so as to avoid any considerable rise of temperature) and the mixture is preserved at ordinary temperatures for a length of time, it appeared almost impossible to doubt that some of this acid must be present in all aromatic sulphuric acid, and that the quantity should be greater in old than in recently-prepared samples.

On looking into the literature of the subject, statements were met with which are directly contrary to each other.

Under the heading of aromatic sulphuric acid, Caspari states, in

his *Treatise on Pharmacy* (2nd edition, 1902, pp. 471-2), that "upon standing, chemical action ensues and a part of the sulphuric acid is gradually converted into ethyl-sulphuric or sulphovinic acid." No authority is quoted.

In the acidimetric test for acid. sulph. aromat., in the *U.S. Pharmacopœia*, 1890, it is explained that the preliminary boiling of the acid for several minutes with some three times its volume of water is "so as to decompose the ethyl-sulphuric acid."

That ethyl-sulphuric acid is present in aromatic sulphuric acid is definitely stated in Remington's *Practice of Pharmacy* (3rd edition, 1894, p. 484); whereas the compilers of the *U.S. Dispensatory*, of whom Remington is one, in the 18th edition of that work, p. 95, quote Atfield's original paper (*Pharm. Journ.* [2], 10, 1869, p. 471) embodying the experiments upon which the statement in his *Manual* is based, in support of the opposite view.

On account of this divergence of statement by pharmaceutical authorities, it seemed desirable to re-examine the matter. With this object in view, I tested, in the first instance, a sample of aromatic sulphuric acid only four days old, which was kindly prepared for me for the purpose by Mr. J. Rutherford Hill. (On the mixing of the alcohol and the sulphuric acid when making this preparation the temperature rose from 18° to 58°C.) A portion of the sample was first diluted with four times its volume of water, and the resulting liquid was briskly agitated with excess of barium carbonate until the mixture no longer reddened a strip of blue litmus paper. After standing overnight to settle, the nearly clear liquid was carefully decanted from the sediment of barium sulphate and carbonate and filtered. The filtrate was evaporated to dryness at a temperature which never exceeded 30°C. The residue was treated several times with absolute alcohol in the cold, to dissolve any oil of cinnamon or extractive matter derived from the tincture of ginger. The portion of the residue which still remained undissolved was next mixed with water to dissolve any barium sulphovinate present, and the mixture was filtered. A residue which was left on the filter-paper dissolved completely and with effervescence in dilute hydrochloric acid, and consisted of barium carbonate (deposited during the evaporation of a solution which had contained barium bicarbonate). The filtered aqueous liquid contained a barium salt in solution, and on evaporation in a confined space, over sulphuric acid, it yielded four- and six-sided crystalline plates of the kind obtainable

from solutions of barium sulphovinate. When these crystals were heated with potassium carbonate and solution of iodine, the odour of iodoform was plainly distinguishable, and when their aqueous solution was boiled a white precipitate of barium sulphate was formed.

The total quantity of barium sulphovinate obtained at the end of the operations described above, from two fluid ounces of the aromatic sulphuric acid employed, did not amount to over half a grain.

After the remainder of the stock of aromatic sulphuric acid had stood for two months, another trial, parallel in every respect with the one just described, was carried out with 2 fluid ounces of it. The final residue of barium sulphovinate was considerably greater in quantity in this experiment than in the preceding one, but still it only amounted to somewhat less than 2 grains.

It was further thought desirable, for the sake of comparison, to experiment with an old sample of aromatic sulphuric acid. Mr. J. Innes Fraser was good enough to furnish me with a sample, the actual age of which was not quite certain, although it was definitely known to be more than a year old. Two fluid ounces of this sample, treated as before described, yielded, relatively speaking, quite a large quantity of barium sulphovinate, the weight of the final residue amounting to 48 grains.

It was not possible, owing to the nature of the operations to be carried out, to make these experiments anything more than rough quantitative approximations, to be used for purposes of comparison. The results obtained are, however, in general accordance with what was anticipated, and they show (1) that aromatic sulphuric acid, when a few days old, does contain some sulphovinic acid, although the quantity is very small, and (2) that the quantity of sulphovinic acid gradually increases when aromatic sulphuric acid is kept for a length of time.

It seems probable that the rate of formation of sulphovinic acid (depending, as we know it does, on the temperature) may be very considerably more rapid in aromatic sulphuric acid at summer temperatures than it is in winter.

It is my intention to further examine, periodically, the progress of the formation of sulphovinic acid in aromatic sulphuric acid as the latter grows older.

I gladly avail myself of this opportunity to express my thanks to my friends Mr. Rutherford Hill and Mr. Innes Fraser for kindly supplying me with the samples for examination.



Mr J. RUTHERFORD HILL said they were deeply indebted to Dr. Dobbin for his paper. He had never been able to discover any record of experiments on the subject except the negative result of Attfield. The modern formula reduces the amount of sulphovinic acid. The old Edinburgh Pharmacopœia method was to keep the ingredients for forty-eight hours at a warm temperature. One exceedingly valuable work to the pharmacist, namely, *Pharmacopœdia*, states that the odour is probably due to sulphovinic acid. The paper confirmed some qualitative experiments made by Mr. Duncan and himself some years ago, in which they obtained barium in solution, apparently as sulphovinate.

Mr EDMUND WHITE thought it should be obvious to any one conversant with the behaviour of alcohol when treated with acids that sulphovinic acid must be formed under the circumstances described.

Dr DOBBIN, in replying, read the following letter he had received from Dr Attfield, in reply to a copy of his paper, which he had sent him:

DEAR DR DOBBIN—I thank you for letting me see a proof of your note on the question of the presence or absence of sulphovinic acid in the aromatic sulphuric acid now official. Thirty-three years ago, in the article made with the powders of cinnamon bark and ginger, I found no sulphovinic acid (*Pharm Journ* 1866 9, p 471). Seventeen years ago, in the aromatic sulphuric acid made with strong tincture of ginger and spirit of cinnamon, Martindale found some sulphovinic acid “on keeping” (*Pharm Journ*, 1885 6, p 452). Now you show that in the aromatic sulphuric acid made with tincture of ginger, spirit of cinnamon, and the slightly stronger spiritus rectificatus a very small quantity of sulphovinic acid is found when the article is ‘a few days old,’ and the quantity “gradually increases when aromatic sulphuric acid is kept for a length of time.” I do not think that the slight variations in the official formulæ of 1867, 1885, and 1908 just alluded to, much affect the question. How an operator practically interprets the word “gradually,” when mixing the sulphuric acid with the spiritus rectificatus, probably has more to do with the matter. A more important factor, doubtless, will be the temperatures of the four ingredients before admixture. Still more important the age of the sample when analyzed. I am glad you intend to make further experiments. As to the statement in my *Manual of Chemistry*, even your present results will induce me, in the 18th edition, to omit the words you have quoted, and to add as follows: “Aromatic sulphuric acid may or may not contain a little sulphovinic acid, dependent on the internal and external temperature during and subsequent to preparation, the age of the sample” etc.

Yours faithfully,

JOHN ATTFIELD.

WATFORD, August 4, 1902

The cordial thanks of the meeting were accorded to Dr. Dobbin.

The following paper was then read :—

### CHINESE OIL OF NEROLI.

By JOHN C. UMNEY, F.C.S., AND C. T. BENNETT.

The product which we have examined under the above name is one that has not, so far as we have been able to ascertain, been reported on either in this country or on the Continent of Europe. Some two or three years since a small sample of an oil described as Chinese neroli oil was sent to Messrs. R. Quincey and Son, of London, in order to ascertain whether it would be worth while to distil such an oil and whether consignments would find any suitable outlet in European markets. We learn that, at that time, the distillers were advised that there was but little probability of a market for the oil in the Port of London; nevertheless, certain suggestions were made to the exporters in reference to methods of distillation, and precise instructions were given as to the care that should be taken so that the flowers only should be used.

Recently a consignment of several pounds of the oil has been received, and we have therefore taken the opportunity of purchasing a portion of the oil for examination. The oil is stated to be derived from *Citrus triptera* (Trifoliata), a species of citrus which grows luxuriantly in Southern Europe, its fruit as met with in Italy resembling the mandarin orange, although not equally edible. In England also the plant will grow out of doors, but does not, we believe, flower. A peculiarity of this species of citrus plant is that it possesses a very considerable number of spines and is on that account used to form a defensive hedge. Information at our disposal is very inexact as to the district of cultivation and distillation in China, the shipment, however, we have examined, was made to this country from Foochow, near Canton.

The oil is of a yellowish-brown colour, becoming paler on exposure to light, and having a very slight and almost imperceptible blue fluorescence, which is very marked when largely diluted with alcohol. It has a peculiar sweet odour, a little difficult to describe, but recalling a mixture of the oils of neroli, lavender, and tarra-gon. It had the following physical characters: Sp. gr. at 15°C., 0.850; optical rotation in a tube of 100 mm. +35°.

A preliminary examination of its chemical characters gave the following results:—Esters as linalyl acetate, 4.79 per cent.; free

alcohols as linalool, 21.41 per cent.; total alcohols, 25.17 per cent. The preliminary examination of the oil shows that it contains certain non-saponifiable matter, and in this respect appears to agree with French neroli oil, which contains a paraffin hydrocarbon. Fractionation under ordinary atmospheric pressure gave the following results: Below 170°C., nil; 170 to 175°C., 30 per cent.; 175 to 180°C., 14 per cent.; 180 to 185°C., 21 per cent.; 185 to 190°C., 7 per cent.; above 190°C., 28 per cent. During distillation under ordinary pressure it was evident that considerable decomposition occurred, and, in consequence, 100 c.c. of the oil were submitted to fractionation under a reduced pressure of about 20 mm. The oil by fractionation under this pressure was divided into three principal fractions:—No. 1 fraction, boiling, 95 to 110°C. (65 per cent.); No. 2 fraction, boiling, 110 to 125°C. (14.5 per cent.); No. 3 fraction, boiling, 125 to 150°C. (10.0 per cent.).

*Fraction No. 1.*—After repeated fractionation this was separated into three portions, as follows:—(A) Amounting to 18 per cent. of the original oil, distilling between 93 and 97°C., having a boiling point under ordinary atmospheric pressure of 165 to 175°C., and an optical rotation of +30°. (B) Amounting to 25 per cent. of the original oil, distilling between 97 and 99°C., with a boiling point of 170 to 178°C. under atmospheric pressure, and an optical rotation of +39°. (C) Amounting to 22 per cent. of the original oil, distilling between 100 and 110°C., having a boiling point under ordinary atmospheric pressure of 173 to 185°C., and an optical rotation of +50°. Consideration of these characters appears to indicate that Fraction No. 1 consists of a mixture of two turpenes, one of which is certainly limonene, and the other of lower optical rotation and lower boiling point, not improbably camphene.

*Fraction No. 2.*—This was separated under reduced pressure into two principal fractions:—(D) Amounting to 7 per cent. boiling at 110 to 115° under reduced pressure, 175 to 190°C. under ordinary atmospheric pressure. (E) Amounting to 7.5 per cent., boiling at 115 to 125°C., under reduced pressure, 180 to 195°C., under ordinary pressure.

*Fraction No. 3* was also separated into two fractions boiling under normal pressure from 190 to 220°C.; practically the whole of which, together with Fraction D and E, consists of linalool.

It seemed likely from the odour of the oil in the first instance that iso-anethol (estragol) the characteristic odorous constituent of tarragon oil, might be present in the oil. This, however, we have not been able to identify by means of the tests described by

A C Chapman (*Chem Zeitg*, **24**, p 376) During fractionation a distinct blue fluorescence was observed in all the fractions, due unquestionably to the presence of the methyl ester of anthranilic acid, the characteristic ester of neroli oil, which, not being easily decomposed, is carried over with the constituents of lower boiling point. The process for estimating methyl anthranilate recommended by Hesse and Zeitschel (*Berichte*, **1901**, p 296) was used for the separation and identification of that substance, but reliable quantitative results could not be obtained owing to the solubility of the anthranilic acid in ether. The percentage, however, is small since the total quantity of esters present calculated as methyl anthranilate amounts to less than 4 per cent.

From the above results it would appear that the chief constituents of the oil are as under —(1) Limonene, (2) camphene (?), (3) linalool, (4) linalyl acetate (traces), (5) methyl anthranilate, (6) a paraffin hydrocarbon. For the purpose of comparison we have tabulated the principal physical and chemical characters of this oil in comparison with oils of neroli and petitgrain.

It will be observed that the oil which is the subject of our note is most closely allied to the so-called Portugal oil distilled from the flowers of sweet orange, the latter, however, contains no methyl anthranilate.

#### COMPARISON WITH FRENCH NEROLI AND PETITGRAIN OIL

|                           | Neroli                                                                       |                                                               |                                                                                              | Petitgrain                                                       |
|---------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------|
|                           | Chinese                                                                      | French (Bigarade)                                             | French (Portuguese)                                                                          |                                                                  |
| Specific Gravity          | 0.860                                                                        | 0.870 to 0.890                                                | 0.860                                                                                        | 0.885 to 0.900                                                   |
| Optical Rotation          | +35°                                                                         | +1° to +5°                                                    | about +30°                                                                                   | 2° to +4°                                                        |
| Esters as linalyl acetate | 4.79 cent                                                                    | 10 to 20 per cent                                             | About 6.5 per cent                                                                           | 30 to 75 per cent                                                |
| Free alcohol as linalol   | 21.11 per cent                                                               | 20 to 25 per cent                                             | —                                                                                            | 25 to 35 per cent                                                |
| Appearance                | Fluorescent                                                                  | Fluorescent                                                   | Not fluorescent                                                                              | Not fluorescent                                                  |
| Known constituents        | Methyl Anthranilate<br>Linalol<br>Linalyl Acetate<br>Limonene<br>Camphene(?) | Methyl Anthranilate<br>Linalol<br>Linalyl Acetate<br>Limonene | No Methyl Anthranilate<br>Solid Hydrocarbon<br>Linalol<br>Dextro Limonene<br>Dextro Camphene | No Methyl Anthranilate<br>Linalol<br>Linalyl Acetate<br>Limonene |

We are of opinion that this Chinese neroli oil cannot replace French oil of neroli, or any of the different varieties of oil of petit-grain as imported into England; nevertheless, the oil has an extremely pleasant and characteristic odour, which certainly could be taken advantage of, both unmixed or blended, for toilet perfumery, or for perfuming soap. We have had the pleasure of presenting specimens of the oil to the Museums of the Pharmaceutical Society both in London and Edinburgh.

The President remarked on the interesting character of the oil, samples of which were passed round. The thanks of the meeting were accorded to Mr. Umney for his paper.

After luncheon the following paper was read:—

#### OLIVE OIL; ITS COMMERCIAL VARIETIES AND THE PHARMACOPŒIAL TESTS.

By JOHN C. UMNEY, F.C.S., AND C. T. BENNETT.

The characters and tests of the British Pharmacopœia for fixed oils are, in our opinion, not only less perfect than they should be, but they do not compare favourably with the means of identification prescribed for other classes of drugs. The characters and tests of castor oil have already been called into question by Thursfield (*Pharm. Journ.*, January 21, 1899, p. 73), Lucas (*Pharm. Journ.*, January 28, 1899, p. 93), Umney (*Pharm. Journ.*, January 6, 1900, p. 8), and Parry (*Chem. and Drugg.*, May 28, 1898, p. 892), whilst those of linseed oil certainly require some modification, as pointed out by Tichborne (*Pharm. Journ.*, November 24, 1900 p. 573).

In the case of olive oil it is perhaps more difficult to frame characters and tests than in the case of either of the preceding oils, as supplies are drawn from widely different districts and prepared by somewhat varying methods. A substance that has such a wide range of usefulness as olive oil, embracing as it does varieties used in large quantities for lubricating, illuminating, leather dressing, etc., and in smaller quantities for culinary and eating purposes, would naturally be expected to differ very much in general character. The inclusion of olive oil in the British Pharmacopœia makes it incumbent on pharmacists to ascertain whether all the grades of oil that they may handle for the production of galenicals or for sale for the many purposes for which it is required, are

pure, and correspond with the requirements of the British Pharmacopœia. There is necessity to determine whether the official characters and tests are reliable indications of pure oils, and further to consider whether the adulteration of olive oil can with certainty be detected by the tests described in the British Pharmacopœia.

It is in order to decide these questions that we have investigated the subject, making our examinations upon most of the varieties of olive oil as met with in this country, disregarding their mode of production or their country of origin. The oils principally handled in British pharmacy are obtained from Italy, France, Spain, Algeria, and the Ionian Isles.<sup>1</sup> The oils chiefly required in pharmacy are of three kinds, and are described as cream or virgin oils, sublime oil, and fine oil. The first named, as a rule, is produced from fruit peeled by hand and by slight pressure, whilst the sublime oils are, as a rule, prepared by equal pressure from the whole fruits both skinned and pulped. The cheapest oils are prepared by strong pressure from the whole fruits, whilst the oil subsequently prepared by hot pressure is used for other than pharmaceutical purposes. There can be no question that very much of the oil that reaches this country does not necessarily come from the district of its production, as statistics clearly show that, at any rate, into some of the districts of Italy that largely export olive oil to this country enormous imports of olive oil are made from other districts.

We will proceed to review the application of the tests that are generally used in the examination of oils, viz., sp. gr., etc., etc.

*Specific Gravity.*—The specific gravity of the British Pharmacopœia, 1898, is from 0.911 to 0.919, but in our opinion these limits might be somewhat narrowed, and indeed the limits of the United States and German Pharmacopœias, which are from 0.915 to 0.918, may be said practically to include all the olive oils met with in commerce that are suitable for pharmaceutical purposes.

*Solubility.*—Practically all the olive oils offered are sparingly soluble in alcohol, but readily soluble alike in ether, chloroform, and carbon bisulphide, and it appears to us that these tests as well as reference to odour and taste, might with advantage be included.

*Acidity.*—In our opinion it might be desirable to include a test

<sup>1</sup> For further information with reference to the source and production of olive oil in different parts of the world, those interested in the subject would do well to refer to a publication by Mr. F. Boehm (see *Pharm. Journ.* [4], 13, 780.)

for limit of acidity, although if characters were given regarding colour and taste the probability is that these features alone would be sufficient indication, apart from the chemical indication, of acidity. The latter should not exceed 1 per cent. calculated as oleic acid.

*Iodine Number.*—A very valuable test for the purity of olive oil is the iodine number, which alone will serve to practically exclude almost all adulterated oils. The iodine number is included in the German Pharmacopœia. Experiments that we have made show that practically the whole of the pure oils of trade have an iodine number varying between 80 and 83, whilst the iodine numbers of sesame oil and cottonseed oil, the principal and most likely available adulterants, are in each case above 100 (see subsequent table).

*Cottonseed Oil Test.*—The cottonseed oil test of the British Pharmacopœia known as Becchi's, is liable, in our opinion, to lead to erroneous conclusions. It is decisive enough if there be an admixture of 10 per cent. of cottonseed oil in the olive oil to be tested, but with smaller quantities it is by no means easy to prove either the absence or presence of the adulterant. We have had the opportunity of examining several low grade olive oils, especially from Spain, Algeria, and Mogador, which certainly showed a tendency to darkening with the test in question, and which by all the other indications were unquestionably free from cottonseed and other adulterants. The reaction produced even with 10 per cent. of cottonseed oil can hardly be said to be one of decided blackening, frequently the colour produced being a reddish-brown rather than a black. A much more delicate test is that of Halphen, which will detect as small a quantity as 1 per cent. of cottonseed oil in lard, olive oil and very many vegetable oils and fats. In the examination of samples of oil representing many thousands of gallons of olive oil this has in every instance proved entirely satisfactory.

*Sesame Oil.*—The British Pharmacopœia includes no test for the absence of sesame oil, but the presence of this oil is not detected by either of the above referred to reactions. In our hands the test that has given greatest satisfaction is that known as Tocher's, which will detect an admixture of 5 per cent. and even less. The reagent consists of a solution of pyrogallol (2 Gms.) in hydrochloric acid (30 Gms.), equal volumes of this solution and the oil to be tested being shaken together in a separator, the aqueous drawn off into a test tube and heated for ten minutes in a water-bath. The development of a distinct violet coloration indicates the

presence of sesame oil. It should be noted that after standing for some time a reddish-violet colour develops even with a pure olive oil, but it cannot be mistaken for the decided violet coloration quickly produced by the presence of sesame oil.

*Arachis Oil.*—Although at the present time the difference in price of this oil and olive oil is not sufficiently great to leave any margin for profitable adulteration, it may be worth while to refer to useful tests for its admixture. The test which we have found most satisfactory is that of Renard, but even this test we have not been able to prove to be conclusive with a smaller proportion than 10 per cent. of admixture of arachis oil. The test consists in separating the fatty acids and precipitating with alcoholic lead acetate; the oleate is dissolved out with ether and the residual lead stearate, palmitate, and arachate are decomposed by hot dilute hydrochloric acid. The fatty acid cake is dissolved in five parts of hot alcohol, and on cooling crystals of arachic acid separate out.

The following chart gives the physical constituents and behaviour of type oils with the various reagents referred to:—

|                   | Olive Virgin.                     | Olive Sublime                            | Olive—Fine.             |
|-------------------|-----------------------------------|------------------------------------------|-------------------------|
| S. G.....         | 0.9167                            | 0.9171                                   | 0.9164                  |
| Iodine Number.... | 81.73                             | 82.15                                    | 80.06                   |
| Becchi.....       | Slightly greenish                 | Yellowish-green                          | Brownish-green          |
| Halphen.....      | Yellow                            | Yellow                                   | Yellow                  |
| Elaidin.....      | Solid white mass with green layer | Nearly solid, yellowish, no marked green | Nearly solid, yellowish |
| Tocher.....       | Slightly reddish-yellow           | Slightly reddish-yellow                  | Slightly reddish-yellow |

|                    | Sesame                                        | Cottonseed.                                                    |
|--------------------|-----------------------------------------------|----------------------------------------------------------------|
| S. G.....          | 0.9226                                        | 0.9230                                                         |
| Iodine Number..... | 100.91                                        | 103                                                            |
| Becchi.....        | Yellow, Menis us golden                       | Reddish-brown                                                  |
| Halphen.....       | Yellowish-white                               | Distinct red tinge with 1 per cent. Deep red with 10 per cent. |
| Elaidin.....       | Reddish-brown, semi-solid                     | Reddish-brown, almost liquid                                   |
| Tocher.....        | Deep violet. Distinct violet with 5 per cent. | Reddish-yellow                                                 |



## SUMMARY.

Summarising results which have been briefly set out in the foregoing note, but which extend over a series of examinations of a hundred or more samples of olive oils drawn from different districts, there can be no question that failure to comply with the present pharmacopœial test does not of necessity imply that the oil is adulterated, whilst certain oils unquestionably adulterated with cottonseed oil have in our hands failed to produce the indications which would suggest impurity when judged by the British Pharmacopœial test. We would suggest the following monograph for a future Pharmacopœia:—

*Oleum Olivæ* (Olive oil).—The oil expressed from the ripe fruit of *Olea europæa*—pale yellow or greenish-yellow, having a faint odour and bland nutty taste. Sp. gr. 0·915 to 0·918 at 60°F. (15·5°C.). It becomes pasty in consistence at 32°F. (0°C.). and forms a nearly solid granular mass. Very sparingly soluble in alcohol, readily soluble in ether, chloroform, and carbon bisulphide. Iodine number, 80 to 84. Five c.c. of the oil placed in a stoppered bottle with 5 c.c. amylic alcohol and 5 c.c. of a 1 per cent. solution of sulphur in carbon disulphide, and heated for an hour in a boiling saturated solution of sodium chloride should develop no reddish tinge (absence of cottonseed oil). Ten c.c. of the oil shaken with 10 c.c. of a freshly-prepared solution of pyrogallol (2 gms.) in hydrochloric acid (30 gms.), and the separated acid liquid heated in a water bath for ten minutes, no distinct violet coloration should be produced (absence of sesame oil).

Mr. NAYLOR said the subject was one of great importance. It had been his misfortune to condemn oil, not because he believed it was not genuine, but because it would not pass the test of the British Pharmacopœia. He dared say Mr. Umney had taken special precautions to satisfy himself that the oils he had examined, and upon which his tests were founded, were really genuine oils. He thought this was essential. With reference to the Mogador oil there did not appear to be the slightest temptation—not even on account of the ignorance of those who had to do with the fruit—to adulterate it, and he had come to the conclusion that the tests of the Pharmacopœia very seriously needed amendment. He would like to ask if Mr. Umney had tried what was known as the gold test (chloroform and auric chloride), and

whether he had found that that would exclude a large number of oils which were generally used to adulterate olive oil.

Mr. BIRD spoke of having, like Mr. Naylor, in many cases condemned oils, not because they were not genuine, but because they failed to come up to the test of the Pharmacopœia. Mr. Umney had rendered very great service in drawing up these characters, which would enable one to form a definite opinion on a sample of olive oil.

Dr. PAUL said he had repeatedly had occasion to examine samples of olive oil, which he believed were genuine, but they could not stand Becchi's test. The principle had a far wider application than olive oil—the subject of the relation of the public analyst to traders generally.

Mr. THOMAS TYRER referred to the relation of the public analyst to traders generally. Again they had the important question raised as to the Pharmacopœia as a standard. That was the reason why he felt impelled to protest against regarding the Pharmacopœia in its present condition as in any sense an infallible standard. It was monstrous that gentlemen of the standing of Mr. Bird, Dr. Paul, and Mr. Umney should have to say that they were convinced that the article was genuine, and yet have to condemn it. The whole thing seemed contradictory, and all should contribute to definite, clear and precise standards, which, through the instrumentality of the Conference, would do inestimable good.

Mr. TOCHER said he was very gratified to learn that Mr. Umney recommended the test for sesame oil which went under his (Mr. Tocher's) name. The German Pharmacopœia contained a test for that adulterant which, he thought was quite unreliable.

The PRESIDENT said that olive oil had been a Golconda to the American manufacturer who had a product to get rid of and who would try everything that would defeat the tests. They would like very much to have a genuine oil. Though cottonseed oil was nice and bland it was not just the kind of oil they would like to have for salad-dressing. They should take care to have genuine articles, and the character of the test Mr. Umney had suggested would fairly cover any likely contamination.

The thanks of the meeting were accorded to Mr. Umney.

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The following paper was then read :—

## NOTE ON CANNABIS INDICA.

BY THOMAS MABEN, F.C.S.

Some few months ago Mr. Merson read a valuable paper on extract of cannabis indica, which on publication gave rise to an extremely interesting series of contributions. I have recently had the pleasure of discussing the subject with an expert in the United States (Mr. H. C. Hamilton) and, believing that the results of that gentleman's experience would be of interest to members of the Conference, I have embodied them in this note.

In the first place it should be stated that Mr. Hamilton assays the value of cannabis by the physiological test, and that some thousands of pounds of the drug and its preparations pass through his hands in the course of a year. The method of testing consists in giving the extract to dogs per stomach, the quantity administered being from 1 to 1·5 milligramme per kilo weight of dog, say  $\frac{2}{3}$  to 1 grain per 100 lb. weight. The result is that after an average dose of active extract the animal in a short time shows signs of excitement and an inco-ordination of its movements, the muscles controlling the legs being particularly affected. This condition becomes more intense from the effects of larger doses, and in some dogs until the animal is scarcely able to keep on its legs or to hold up its head. Insensibility rarely occurs except from immense doses, and this worker has never known death to ensue, the dogs recovering perfectly in every instance, even after a dose of 15 milligrammes per kilo weight—about 1 grain to 10 lb. He is therefore inclined to believe that cannabis is not a poison in the sense that an overdose would be the direct cause of death.

Secondly, it has been frequently noted that an extract of cannabis is active with one patient and apparently inactive when given to another. With reference to this, Mr. Hamilton has never found an extract that was active on one dog to be absolutely inactive on another dog, or on the same dog, at another time. But different dogs do vary greatly in their susceptibility to the drug, and in the manner in which they are affected, so that it is necessary to be acquainted with the dog, or to use several dogs, in order to be quite certain how the sample compares with the standard. It is therefore possible that the remarkable idiosyncrasy in the human subject, in relation to the drug may, to

some extent, account for the belief that some extracts are very active and others quite inert.

Thirdly, Mr. Hamilton states that there is not, in the different samples of drug examined by him, that great variation in activity which is well known to be characteristic of commercial cannabis. It should, however, be borne in mind that only the picked drug is submitted to him, everything in the least degree doubtful as to age or physical appearance having already been rejected, and it is therefore quite certain that his experience does not cover the entire range of the Indian hemp of commerce. While he finds that there is undoubtedly variation in the quality of the drug, he has, so far as he is personally concerned, never found a sample that was completely inert. This evidence would have been of more value if the weeding-out process had not taken place before the drug reaches him.

Fourthly, subsequently to the publication of Dr. Marshall's original paper, Mr. Hamilton extracted from the crude drug an oil which corresponded in almost every respect with that described in that paper, except that it was physiologically inactive. When Mr. Hamilton adopted the method followed by Wood, Spivey & Easterfield in preparing the cannabinal which they sent to Dr. Marshall to test—i.e., from the alcoholic extract—he had these results. The oil was very difficult to separate, but he succeeded in obtaining about an ounce. More could have been obtained under proper conditions, and he is sure that he did not separate all that might have come over. But the fraction that did distil at the temperature and pressure found most favourable by Wood, Spivey & Easterfield was less active, physiologically, than the original solid extract. It was only slightly active, while the residue was quite active.

With reference to the nitro-derivative obtained by Wood, Spivey & Easterfield, Mr. Hamilton obtained this substance both from the distillate and from the residue. They were similar in appearance and apparently identical with that obtained by these other workers, and both were physiologically inactive.

As the result of his experiments, Mr. Hamilton believes that the cannabinal prepared according to Wood, Spivey & Easterfield's process is not the active principle of cannabis; and further that, so far as our present information extends, the active principle has not yet been isolated.

The author was cordially thanked for the above paper.

The following communication was then received:—

## A REVIEW OF RECENT WORK ON CANNABIS INDICA.

BY C. R. MARSHALL, M.D.,

*Professor of Materia Medica and Therapeutics in the University of St. Andrews.*

When asked if I could give you something new about cannabis indica, I had to confess that I could not. Since my last paper was written I have made no further experiments, and my collaborators have published no further papers. But in thinking over the matter it occurred to me that by giving you an idea of the present state of the subject, I might be able to tell you something of interest. At the same time I thought I might show you some of the products obtained, as well as some natural products not usually found on the market.

The three main natural products of cannabis indica are charas, gánjá and bháng. Gángá, as you know, is the official form of the plant—the dried flowering or fruiting tops of the female plant from which the resin has not been removed—and, therefore, it is the part most usually seen in this country. Charas is the resinous principle of the plant grown in more northern regions, with adhering hairs and other matter. It is collected by men, usually wearing leathern jackets, running through the hemp fields until the resin has sufficiently adhered. It is then scraped off and rolled into balls. It is the most active of the natural products of Indian hemp, and in the bazaars not more than 5 tolas (or 2 ounces) can be bought at any one time. A piece the size of a pea is sufficient to produce marked intoxication. Bháng consists simply of the broken stalks and leaves, sometimes of the fruits and young twigs also, and is the least active of the hemp products. It is made into drinks and sweetmeats, and, as it grows around the native huts, most of it probably escapes duty. Samples of each of these products are before you. Much the most interesting is charas, and it is on this that most of the recent work has been done.

Three Cambridge chemists—Wood, Spivey & Easterfield—obtained a large quantity of this substance through the kindness of the Indian Government, and extracted it with organic solvents (ether, petroleum ether, etc.).<sup>1</sup> By subsequent evaporation of the

<sup>1</sup> *Trans. Chem. Soc.*, vol. lxi., p. 599 (1896).

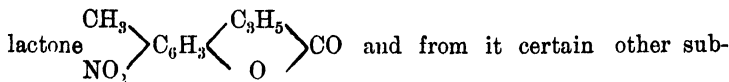
solvent and distillation of the residue they obtained five substances a terpene, boiling at 163–180°C, yield 15 per cent, a sesquiterpene, boiling at 258–259°C, yield 20 per cent, a paraffin ( $C_{29}H_{60}$ ), m p 63–64°C, yield 0.15 per cent, what they term a toxic red oil, boiling at 265°C, under 20 mm Hg pressure, and a pitchy residue. These substances were sent on to me for pharmacological examination. As there was no reason to think the terpenes or paraffin possessed any characteristic cannabis action, I at once turned to the red oil or resin. And this proved to be markedly active. One and a half grains produced marked intoxication, and a distinct action was obtained with  $\frac{1}{4}$  grain. My experiments with this I have described elsewhere,<sup>1</sup> and I need not repeat them here. The substance undoubtedly was or contained the active principle. As it boiled at such a high temperature and possessed certain fairly definite constants it seemed very like a pure principle. The formula,  $C_{18}H_{24}O$ , was given to it, and as it contained an alcoholic hydroxyl group the name cannabinol was suggested for it. It was shown to be present in Smith's cannabis (80 per cent), Meck's cannabinon (50 per cent), and certain other cannabis preparations. Later,<sup>2</sup> however, this substance was found to contain at least two substances one having the formula,  $C_{21}H_{34}O_2$ , which possesses a crystalline acetyl derivative, and another (possibly more) is yet undetermined product. Unfortunately the new cannabinol ( $C_{21}H_{34}O_2$ ) had practically no physiological action, and nothing more has yet been done to determine which is the active ingredient. The loss of activity may have been due to the chemical transformations the substance had undergone, but into this question I do not wish at present to enter, five or six years hence, when my sealed tube of cannabinol will have stood ten years if I am able, I hope to do so, providing, of course, that the matter has not previously been settled.

I might say in passing that the chemical part of the subject has been carried well forward, certain derivatives of cannabinol have been prepared and certain decomposition products obtained. But none of these possesses any immediate physiological interest. By oxidizing tri-nitro-cannabinol with fuming nitric acid, three fatty acids—butyric, valeric and caproic—have been obtained, and also a substance known as oxy-cannabin. This substance, which has

<sup>1</sup> *Lancet*, 1897, 1, p. 235, *Journ Amer Med Assoc*, 1898, Oct 15, p. 882

<sup>2</sup> *Trans Chem Soc*, 1899, p. 20

a formula,  $C_{11}H_{11}NO_4$ ,<sup>1</sup> has been shown to be nitro-cannabinol-



stances have been prepared. It was in the synthetic study of this that one of the trio—Mr. Spivey—so unfortunately lost his life.

But to return to cannabinol. On allowing this, which you see is transparent, to stand in an open test-tube in the laboratory, I found that the upper layers gradually began to darken, and after a time they became opaque. This at once suggested an oxidation process, and by passing oxygen through the liquefied resin for nineteen hours I converted it into a brittle pitchy mass. Some of this I show you. Another cannabinol sample similarly treated with  $\text{CO}_2$  showed practically no change. From these and other circumstances I deduced what I think is fairly conclusive, that much of the loss of activity of Indian hemp is due to oxidation. The whole loss of activity may not be due to this; the terpenes may play a part, and there may be, although I doubt it, some transformation of the cannabinol, or whatever the active principle is. It is very evident that all cannabinols have not the same activity. Some prepared by a manufacturing chemist, presumably in the same way, had only one-quarter of the activity of the cannabinol prepared in the Cambridge laboratories. Why this should be so I do not know; but I believe it is possible to find out. It may, as I have suggested elsewhere, be converted into an isomer, but this we do not yet know. There is nothing improbable in it. Hyoscyamine is readily converted into atropine, pilocarpine into isopilocarpine, and each of these changes is accompanied by a marked change in physiological action. I could cite many other instances of marked differences in physiological action resulting from slight changes in chemical constitution. But whatever the change of activity be due to, I firmly believe that the active principle of Indian hemp is of the nature of this red oil or resin of Easterfield, Spivey & Wood.

There are many other points connected with cannabis indica on which I might speak, but I shall content myself with one. It is connected with the two pieces of charas in front of you. One, which is evidently much the more resinous, is by far the better

<sup>1</sup> Dunstan and Henry (*Proc. C. S.*, 1898, p. 44) give the formula as  $C_{10}H_{10}NO_4$ .

sample of the two. It contains, or contained, 33 per cent. of cannabinal. The other only yielded 10 per cent.

But it is not simply on the amount of extractive matter that the quality of Indian hemp depends. It is also largely due to the age of the specimen. The drug deteriorates, and there is some reason for thinking that old and useless samples are often shipped to this country for pharmaceutical purposes. To my mind it would be far better to employ the more potent and more stable charas for making preparations than the official gánjá, and I would suggest its introduction into the Pharmacopœia for that purpose. But I do not believe much in the therapeutic efficacy of this drug, and I doubt if it will be largely used in the future. Scientifically, however, it is very interesting, and its interest lies not only in its active principle and the determination of its chemical constitution, but also in the way in which this substance is formed in the plant. I believe, in fact, that from it we may subsequently derive some knowledge of the synthetic processes going on in the vegetable kingdom leading to the formation of such curious products.

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The PRESIDENT thanked Professor Marshall for his interesting communication.

Mr. J. C. UMNEY explained some experiments he had made with the view of getting over the objection to extract of cannabis indica forming two layers. He had used acetone to extract the drug, and thus was enabled to evaporate at a lower temperature. The extract so obtained was compared with the ordinary alcoholic extract by Dr. Dixon, of Cambridge, and it was found that the alcoholic product was much more active.

The following paper was then read :—

#### THE OXIDATION AND DETERMINATION OF URIC ACID AND URATES.

By J. F. TOCHER, F.I.C., F.C.S.

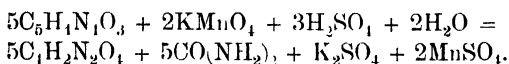
A simple and rapid method for the determination of urates would be much valued by medical practitioners, pharmacists, and others who are regularly called upon to examine urine and to perform urine analysis. Such a method exists for determining the chief nitrogenous constituent—urea. No method, however, exists for determining uric acid, which is simple enough to permit



of the operation being carried out in a minute or two, as is the case with urea, when determined by hypobromite in the Doremus tube, or even in the ordinary ureometer. The process here described is intended to supply to some extent the generally expressed want. It depends upon the fact that uric acid has been found to be quantitatively converted into urea by chromic anhydride, the urea formed being determined in the ordinary way by hypobromite. The first experiments were conducted on pure uric acid, using permanganate as the oxidizing agent. As these experiments throw some light on the nature of the reaction which takes place during the titration of uric acid by Hopkins' method, they will be first described. Hopkins' method is based on the insolubility of acid ammonium urate (Fokker, *J. C. S.*, **28**, 1293), and the subsequent titration of the separated urate in acid solution at 60° by N/20 permanganate.

Blarez and Deniges (*Comptes rend.*, **104**, 789) found that in a solution containing not more than 0.0125 per cent. of uric acid, 1 c.c. of decinormal permanganate was reduced by 0.0074 Gm. uric acid, but the nature of the reaction does not appear to be understood. A. H. Allen (*Com. Org. Anal.*, vol. iii., Part III., 365) states that it corresponds to no simple reaction, and, as a result of an investigation of the process, obtained figures ranging from 96 to 104 per cent. of the truth. On taking as the end reaction the point at which the permanganate ceased to be instantly decolourised, he obtained much closer figures, but when the titration was conducted at a boiling heat instead of at 60°C, the results were higher. It is known that, by treatment with strong nitric acid, uric acid yields alloxan and urea, while allantoin is formed on treating uric acid with alkaline permanganate in the cold. It is possible, therefore, that uric acid is oxidized in acid permanganate solution to alloxan and alloxantin or both. A solution of uric acid was prepared in weak alkaline solution (25 c.c. = 0.084 Gm.). This quantity was acidified and titrated with N/10 permanganate at 60°C., 11.4 c.c. being used. This is equivalent to 0.0855 Gm., using Hopkins' factor (0.0075 Gm. uric acid = 1 c.c. N/10 permanganate). The solution was evaporated to about one-fourth its bulk, carefully neutralized with soda and tested for alloxan. Alloxan is soluble in water, combines with alkalis, etc., forming alloxanates, and is converted into parabanic acid on further oxidation. It is stated to give a deep blue colour with ferrous sulphate, but this is not the case. The presence of a base such as potash or barium is necessary, when an alloxanate is formed. The behaviour of alloxan with

dilute ammonia is notable, and seems to have been overlooked. On gently heating a crystal of alloxan in dilute ammonia a deep rose-red colour is produced, which is changed to purple by potash or soda. This reaction serves to identify the minutest trace of alloxan, and to distinguish it from alloxantin, which is insoluble in water and gives a purple colour with ammonia (murexide test). It should be here noted that the coloration produced by the addition of ammonia to the urine residue which has been treated with strong nitric acid, is mainly due to alloxan and not alloxantin, as usually stated in text-books and works of reference. On draining off the crystals of sodium sulphate from the mother liquid containing the oxidation products from 0.084 Gm. uric acid in the foregoing experiment, and evaporating to dryness and moistening with ammonia the rose red colour just described was instantly produced. In other experiments the mother liquor was treated with baryta water and ferrous sulphate, and gave a bluish precipitate and a blue solution. One of the products of oxidation of uric acid by means of the dilute acid permanganate is therefore alloxan. The reaction appears to be as follows:—



Alloxan and urea are both formed, theory requiring 10 c.c. N/10 permanganate for 0.084 Gm. uric acid, while 11.4 c.c. were actually used. On dissolving 0.1 Gm. alloxan, acidifying and adding N/10 permanganate .9 c.c. was used at 60°C., and on twenty minutes' boiling, 10 c.c. permanganate were reduced. It will therefore be seen that theoretically 1 c.c. N/10 permanganate is equal to 0.0084 Gm. uric acid, but that owing to the action of alloxan, a further portion of permanganate is reduced at 60°C. Urea has also some action at that temperature as will presently be shown. The inconstant figures obtained by Hopkins' method are mainly due, therefore, to the presence of alloxan formed during the titration. A figure more approximating theory can be obtained by carrying out the titration on the cold, and in a largely diluted solution. The following results were obtained at 15°C, 25 c.c. (0.084 Gm.) uric acid being used:—

|                                                                                | Volume. | No of c.c. N/10<br>Permanganate Used. |
|--------------------------------------------------------------------------------|---------|---------------------------------------|
| 200 c.c. . . . .                                                               |         | 10.8 c.c.                             |
| 200 c.c. . . . .                                                               |         | 11.0 c.c.                             |
| 100 c.c. . . . .                                                               |         | 11.4 c.c.                             |
| 26 c.c. (25 c.c. uric acid, 1 c.c. dilute H <sub>2</sub> SO <sub>4</sub> ) . . |         | 12.0 c.c.                             |

If the end reaction is taken at the point the permanganate colour remains permanent for about fifteen seconds, Hopkins' factor is reliable.

An attempt was next made to oxidize uric acid to urea and carbonic acid by boiling with a known volume of permanganate solution. This was done in order to ascertain whether the reaction could be utilized as a rapid and accurate method of determining uric acid. The following is a summary of the results:—

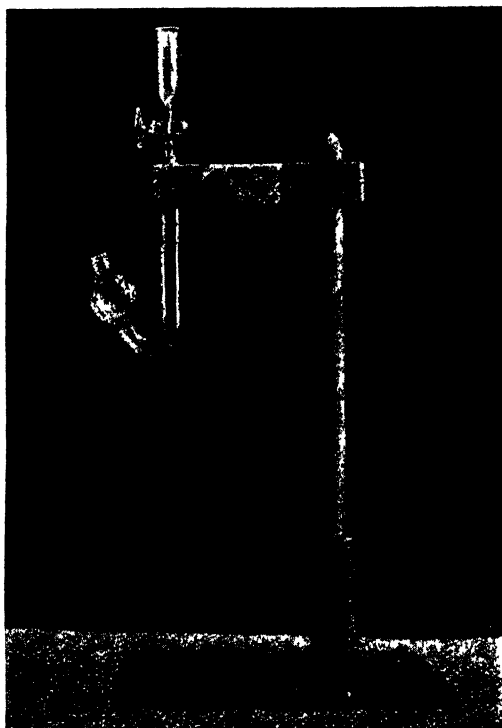
| Amount taken. | Solvent. | Temp   | Duration of Boiling. | No. of c.c. N/10 Permanganate Used |
|---------------|----------|--------|----------------------|------------------------------------|
| 0.084 Gm. ... | Acid     | 70°C.  | —                    | 17 c.c.                            |
| 0.084 Gm. .   | Acid     | 80°C.  | —                    | 19 c.c.                            |
| 0.084 Gm.     | Acid     | 100°C. | Thirty seconds       | 22 c.c.                            |
| 0.084 Gm...   | Acid     | 100°C. | Three minutes        | 24.8 c.c.                          |
| 0.084 Gm...   | Acid     | 100°C. | Five minutes         | 30 c.c.                            |
| 0.084 Gm. .   | Acid     | 100°C. | Five minutes         | 28.5 c.c.                          |
| 0.084 Gm ...  | Acid     | 100°C. | Ten minutes          | 31.0 c.c.                          |
| 0.084 Gm ...  | Acid     | 100°C. | Ten minutes          | 33.5 c.c.                          |
| 0.084 Gm...   | Acid     | 100°C. | Prolonged boiling    | 42.8 c.c.                          |

If the urate is boiled with an excess of permanganate in alkaline solution and then acidified, similar but somewhat lower figures are obtained, as the following shows:—

| Amount Taken. | Duration of Boiling                                 | No. of c.c. N/10 Permanganate. |
|---------------|-----------------------------------------------------|--------------------------------|
| 0.084 . . . . | One min. in alkaline solution and one min. in acid  | 21.3                           |
| 0.084 . . . . | One min. in alkaline solution and one min. in acid  | 20.8                           |
| 0.084 . . . . | One min. in alkaline solution and one min. in acid  | 20.5                           |
| 0.084 . . . . | Five min. in alkaline solution and one min. in acid | 27.5                           |
| 0.084 . . . . | Prolonged boiling                                   | 43.5                           |

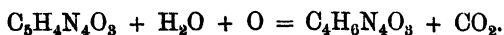
It appears that Jolles (*Zeitschrift für physiol. Chemie*, **29**, 202) has carried out experiments on somewhat similar lines to the foregoing, and apparently with constant results. On boiling 0.1 Gm. uric acid in a known excess of alkaline permanganate for five minutes and titrating back, he found, as the mean of eight experiments, that 38.13 c.c. N/20 permanganate were reduced. The greatest variation from the mean was only 0.05 c.c., a remarkable

constancy which, as will be seen by Table No. 2, it has not been my fortune to experience. It is known that allantoin is one of the products of the oxidation of urates in alkaline permanganate solution, and if, instead of using caustic alkali, carbonated alkali is used, the reaction can be utilized to determine uric acid, the titration figure, however, being below instead of above theory, as is the

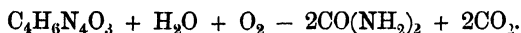


HYPOBROMITE TUBE No 1, FOR DECOMPOSITION OF THE CHROMIC UREA FLUID.

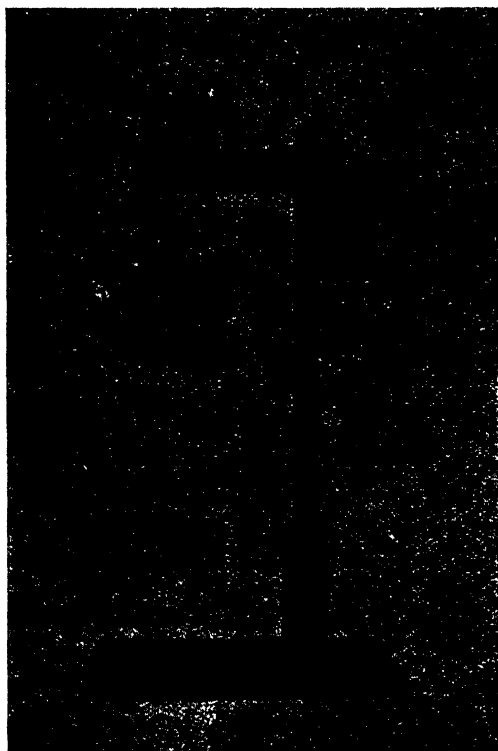
case in Hopkins' method. The end reaction is indicated by the precipitation of  $\text{MnO}_2$ , and, if the titration is carried out at the boiling point, is sharply defined. With 25 c.c. uric acid solution ( $= 0.084 \text{ Gm.}$ ) 8.5 c.c. N/10 permanganate were reduced; 10 c.c. are required by theory. The following equation represents the reaction—



When uric acid is boiled with excess of permanganate in alkaline solution, cooled, acidified, and boiled for some time, the whole of the allantoin is converted into urea as follows—



The presence of urea precludes the possibility of utilizing the re-



HYPORBOMITE TUBE, No. 2, FOR DETERMINATION OF UREA IN 1 C.C.  
SAMPLE.

action as a method for determining uric acid by titration with permanganate, as this oxidizing agent is acted upon considerably at the boiling point, *e.g.*, 1 Gm. urea was dissolved in water, acidified and raised to 100°C. During boiling, N/10 permanganate was added in excess and the excess determined by N/10 oxalic acid, when it was found that 4.4 c.c. permanganate had been reduced

by the urea. This explains the variable figures found in table 2. If, however, the fluid is neutralized and treated with hypobromite in the ordinary way, nearly the theoretical amount of N liberated by this method can be obtained. The period required for complete oxidation and the bulkiness of the fluid in the ureometer flask are factors telling against the determination of uric acid by this means.

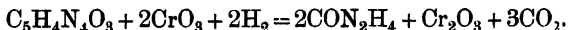
On using chromic anhydride instead of potassium permanganate as an oxidizing agent, it was found that uric acid was readily and wholly converted into urea and carbonic acid.

A measured quantity of the urate solution (containing 0.084 Gm uric acid) was treated with about 2 Gm chromic anhydride and a little water added. The mixture was boiled for two minutes, cooled, alkalinized and the urea determined by Allen's modified hypobromite process, using potassium cyanate, and the strong solution of bromine in potassium bromide recommended by him. The following results were obtained:—

| Amount taken<br>25 c.c. solution | Oxidizing<br>Agent | C.c. of N required<br>by theory | Nitrogen evolved |       |
|----------------------------------|--------------------|---------------------------------|------------------|-------|
|                                  |                    |                                 | Uncorr.          | Corr. |
| 0.084 Gm                         | CrO <sub>3</sub>   | 22.33                           | 21.3             | 22.1  |
| 0.084 Gm                         | CrO <sub>3</sub>   | 22.33                           | 21.5             | 22.11 |
| 0.084 Gm                         | CrO <sub>3</sub>   | 22.33                           | 21.1             | 22.05 |

When the hot oxidized uric mixture was treated with alkali, prior to being placed in ureometer flask, a very faint odour of ammonia was noted in some of the experiments. In order to ascertain whether ammonia was formed to any great extent, the alkaline uric solution from 0.168 Gm uric acid was placed in a Kjeldahl flask and distilled into 20 c.c. normal acid, and the acid titrated, when 19.6 c.c. soda were used. This represents 0.0068 ammonia in 0.168 Gm uric acid, or about 4 per cent. The alkaline residue was evaporated to about 30 c.c. and placed in the ureometer flask. On treating with hypobromite, 1.8 c.c. N were evolved. During the evaporation of the alkaline residue, the vapour given off slowly turned red litmus blue, indicating that the evolution of ammonia was slow. These experiments tend to show that uric acid is converted into urea by chromic anhydride and that a small portion of the urea may, in a concentrated solution of the oxidizing mix-

ture, be converted into ammonia. The following equation represents the reaction:—



As the gas burette, with the special flask and fittings necessary for the foregoing determinations, is too elaborate an apparatus for ordinary medical and pharmaceutical practice, attention was next directed towards simplifying the process for everyday clinical use. A modification of the Doremus tube was found to answer the purpose admirably. From the accompanying figure it will be seen that the modified apparatus has a cup and stopcock attached to the upper part of the longer limb of the hypobromite tube. To determine the uric acid by this tube it is necessary simply to fill the tube with strong hypobromite solution. To determine the uric acid by this tube it is necessary simply to fill the tube with strong hypobromite, and place the oxidized alkalinized uric solution in the cup. On opening the stopcock the solution flows into the hypobromite and is immediately decomposed. The stopcock is closed when the cup is almost empty, a little water is added, the stopcock again opened, and the water allowed to pass into the hypobromite. The stopcock is again closed, and, on gently rotating the tube, the reaction is accelerated. After ten minutes the volume is read off. With a solution containing 0.01 Gm. uric acid 2.8 c.c. N. were obtained. Theory required 2.6 c.c. (corrected). Constant results were obtained on conducting similar experiments.

#### APPLICABILITY OF THE CHROMIC METHOD TO URINE ANALYSIS.

There are several methods of treating the urine in order to separate the urates. The method adopted here is that of precipitation as acid ammonium urate. Solid ammonium chloride was added to 50 c.c. urine until the fluid was saturated. The fluid was set aside for an hour. The precipitate was then collected on a filter and washed with ammonium chloride solution, when it was dissolved in a little weak soda solution, and the whole boiled to expel the ammonia. The solution was now treated with a little  $\text{H}_2\text{SO}_4$ , and about 2 Gm.  $\text{CrO}_3$ , and boiled for two minutes. After cooling the fluid was alkalinized to make up to 50 c.c. For the purpose of determining the nitrogen 2.5 c.c. (=2.5 c.c. urine) were placed in the cup of the hypobromite tube. The cup was washed out as previously described. 2.9 c.c. N. were evolved. Further experiments gave 2.8, 2.9, 2.8, 2.8 (uncorr.), using hypobromite alone; 2.8 c.c. N. (uncorr.) in 2.5 c.c. represent

0.42 per cent. uric acid. 25 c.c. of the same sample treated with solid ammonium chloride, and the precipitate dissolved in dilute acid, required by Hopkins' method 13.6 c.c. and  $13.6 \times 0.0075 \times 4 = 0.408$  per cent. uric acid. Where extreme accuracy is desired, and when the proportion of uric acid in urine is small, the whole ammonium urate precipitate from 50 c.c. urine may be taken, treated with soda, and then with  $\text{H}_2\text{SO}_4 + \text{CrO}_3$ , and determined as N. in the gas burette, using the special apparatus figured in No. 2. A sample, low in urates, was treated in this way, 50 c.c. being used. 29.5 c.c. N. (corr.) were evolved. 50 c.c. of the same sample, determined by Hopkins' method required 14.0 c.c. N/10 permanganate. The uric acid as shown by the Hopkins and chromic methods amounted, therefore, to 0.218 and 0.21 per cent. respectively. A further portion of the same sample was reserved for treatment with chromic anhydride direct, as described in the following experiments, which were carried out with a view to simplify the chromic process for clinical use.

#### TOTAL NITROGEN MEASURED IN HYPOBROMITE TUBE. •

Urea, when treated with dilute  $\text{H}_2\text{SO}_4$  and  $\text{CrO}_3$ , undergoes scarcely any change, even if boiled for a minute or two. As has already been shown, the ammonia formed is very small. As urates are quantitatively converted into urea by boiling with  $\text{H}_2\text{SO}_4 + \text{CrO}_3$ , the uric and ureal nitrogen can quite approximately be determined in the hypobromite tube, the nitrogen as urea, deducted from the total nitrogen, giving the uric acid nitrogen. Experiments with prepared solutions of urea and uric acid were first carried out. Solutions of (1) urea (2 per cent.) (2) uric acid (0.75 per cent.), and (3) urea (2 per cent.), + uric acid (0.75 per cent.) were prepared, and the nitrogen in each determined in the hypobromite tube, which was graduated to show 0.001 Gm. urea (=0.0014 uric acid). 1 c.c. ureal solution gave 0.02 Gm. urea; 1 c.c. uric solution gave an equivalent of 0.002 Gm. uric acid, so that about 26 per cent. of the uric acid was decomposed without the addition of  $\text{CrO}_3$ . It is well known that uric acid yields with hypobromite varying amounts of nitrogen (20–70 per cent.), according to the degree of concentration, etc. 10 c.c. of uric solution boiled with  $\text{CrO}_3 + \text{H}_2\text{SO}_4$  made up to the original bulk, and 1 c.c. taken gave 0.006 Gm. urea, or an equivalent of 0.008 Gm. uric acid (theory 0.0075 Gm.), while 1 c.c. of the mixed uric and ureal solution, treated in a similar manner gave 0.0255 Gm. urea, 0.02 Gm. being due to urea and 0.0055 Gm.

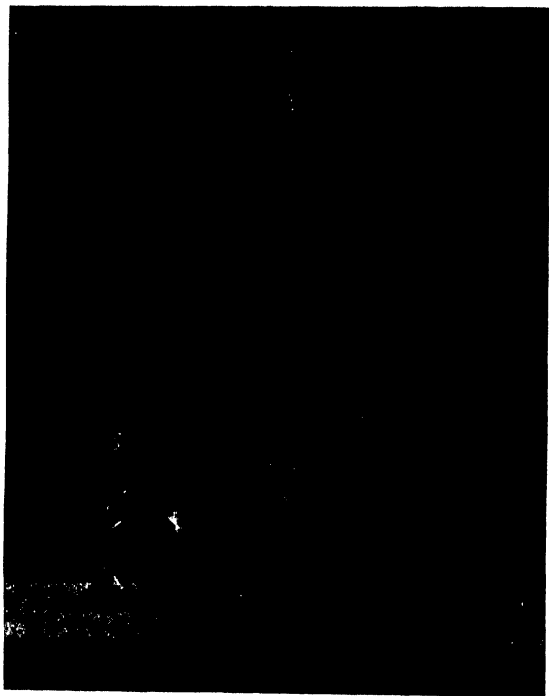


(= 0.0077 Gm. uric acid) to the uric acid present. An experiment with the sample of urine giving 0.21 per cent. uric acid by both chromic and Hopkins' method was now conducted in the hypobromite tube. 10 c.c. of the sample were boiled with a little  $\text{H}_2\text{SO}_4 + \text{CrO}_3$ , cooled, and made up to the original bulk. 1 c.c. gave 0.0225 Gm. urea. 1 c.c. of the untouched sample gave 0.021 Gm. urea. Then  $0.0225 - 0.021 = 0.0015$  due to uric acid; and this is equal to 0.002 uric acid in 1 c.c. or 0.2 per cent. Experiments with other samples gave concordant results. This process is a simple technical one, and can be carried out in a few minutes. It should be very useful to those engaged in the daily examination of urine. The tests should be carried out as follows:—

1. *With Nitrometer (for Urine low in Urates).*—Saturate a measured quantity of urine with solid ammonium chloride (as in the Hopkins' and other methods), and collect the ammonium urate. After washing with ammonium chloride solution, dissolve in weak soda solution, and boil off the ammonia. Acidify the fluid with dilute sulphuric acid, and add 2–3 Gm. chromic anhydride and boil. Cool, and transfer to the separating funnel of the gas-measuring apparatus. Place the hypobromite solution in the flask, and connect the whole apparatus, taking care to equalize the measuring tube. Open the funnel stopcock and permit the chromic mixture to flow into the hypobromite. Nitrogen is immediately evolved, and is read off after ten minutes' standing. 1 c.c. N. = 0.00375 uric acid at ordinary temperature and pressure. If Allen's modified hypobromite process is used 1 c.c. N. = 0.00375 of uric acid at  $0^\circ\text{C}$ . and 760 mm. Of course, by the method here described, 92 per cent. N. of the urea from uric acid is evolved. The construction of the reaction flask requires to be explained. It is similar to that described by Allen. A small flask is fitted with an indiarubber cork with two apertures. The limb of the funnel tube is passed into one, and a stopcock tube into the other. The funnel tube is also fitted with a cork with two apertures. The other end of the stopcock tube is bent round and passed through one aperture, while the other is fitted with a small glass tube, to which, when necessary, the rubber tube of the nitrometer is attached. The chromic mixture is run into the funnel tube through the small tube, which for this purpose is temporarily connected with a small funnel by means of a small indiarubber tube. The arrangement here described prevents the displaced air from the flask reaching the measuring tube of the nitrometer.

2. *With Hypobromite Tube (for Clinical Work).*—Measure

10 c.c. of the sample, and place in a small beaker with about 2 c.c. dilute  $\text{H}_2\text{SO}_4$  and 2 Gm.  $\text{CrO}_3$ . Boil for two minutes, placing in the fluid a small glass rod to prevent bumping. Allow the fluid to cool, and make up the volume to 10 c.c. Prepare some strong hypobromite solution by adding 2.5 c.c. bromine to 30 c.c. strong caustic soda solution. Fill the tube and measure 1 c.c. into the cup (of the modified hypobromite tube—if the ordinary



NITROMETER, WITH FLASK AND FITTINGS, SHOWING ARRANGEMENT FOR DECOMPOSING THE UREAL FLUID.

tube is used, take the 1 c.c. pipette), and gradually pass the urinary fluid into the hypobromite solution. Rotate the tube gently to promote the reaction and then read off. The tube is graduated to show milligrammes in 1 c.c. and  $0.001 \text{ urea} = 0.0014 \text{ uric acid}$ , so that each division is equal to 1 milligramme of urea, and 1.4 milligramme of uric acid. Determine the urea present, using 1 c.c. of the sample, from which the urates have been preci-

pitated as barium urate.<sup>1</sup> Deduct the amount from the uric acid urea, as found by the chromic method, and multiply by 1.4. This gives the uric acid in milligrammes, in 1 c.c. of urine. Multiplying, instead, by 140 of course gives the percentage. The nitrogen of the oxaluric bases may be included, but the amount is so small that, in this process, the result is not materially affected.

The determination of uric acid and of the oxaluric bases, by titration with bichromate and iron, will be given in a future paper.

The PRESIDENT, in thanking Mr. Tocher for his paper, said it was of such a painstaking character that it would prove a valuable addition to the chemistry of the subject. -

The following contributions from St. Thomas's Hospital laboratory were then read by Mr. White:—

#### ASEPTIC SURGICAL SHAVING PASTE.

BY EDMUND WHITE, B.Sc., F.I.C.

In the *St. Thomas's Hospital Gazette*, last year, I published an account of a scheme devised for the preparation of skin areas of patients about to undergo surgical operations. It is customary to thoroughly cleanse the skin area by scrubbing with soap, or ether-soap, and in many cases this area is shaved immediately before the operation. Apart from the application of routine methods of disinfection to the hands and appliances of the hospital barber, whose duty it is to carry out this preliminary shaving, the scheme involved the rejection of the ordinary method of shaving by means of lather, since this also involved the use of a brush, which cannot be rendered aseptic. A substitute for the lathering was found in a wax-emulsion, which could be applied by the hand to the area to be shaved, and some particulars of this emulsion and of the details of the scheme will be found in an abstract in the *Pharmaceutical Journal* of May 3 last. The formula for the wax-emulsion was not, in the original papers, published in detail, because, although the material then in use successfully fulfilled the functions for which it was devised, I thought the emulsion might be improved

<sup>1</sup> A little powdered barium chloride and a drop or two of baryta water are added to 10 c.c., the whole stirred, and, after the precipitate has subsided, 1 c.c. withdrawn for determination of urea.

in several points by further experience in use and manufacture. The formula I now publish is the result of this experience, and is as follows:—

|                            |    |                 |
|----------------------------|----|-----------------|
| Hard Paraffin (m.p. 55°C.) | 22 | parts by weight |
| Prepared Suet . . . .      | 3  | " "             |
| Soft Soap . . . .          | 2  | " "             |
| Boiling Water . . . .      | 68 | " "             |

Place these materials in a vessel surrounded by boiling water, and when the fats are melted beat them together until a smooth, white emulsion is obtained. Continue the beating, maintaining the temperature above 70°C., and shake in gradually

|                               |   |       |
|-------------------------------|---|-------|
| Tragacanth, in powder . . . . | 2 | parts |
|-------------------------------|---|-------|

When the mixture is homogeneous, allow it to cool by removing the boiling water, and when nearly cold add

|                           |   |       |
|---------------------------|---|-------|
| Glycerin . . . . .        | 2 | parts |
| Oil of Lavender . . . . . | 1 | part  |

I have employed the ordinary beater-mixing machine for making it, but small quantities may be made equally well by means of an egg-whisk in a stone jar standing in a saucepan of boiling water.

My first experiments were made with paraffin, water, and tragacanth alone, but emulsification was troublesome and uncertain, and I afterwards found the addition of some other fat, such as suet, lard, or tallow, and the use of a little soft soap greatly facilitated the operation. The tragacanth was then added to impart the necessary viscosity and to prevent the separation of palpable particles of wax during cooling. The addition of a little glycerin prevents the film drying too rapidly on the skin, but only a small proportion can be used, as larger proportions render the skin sticky.

In use a small quantity is rubbed over the area to be shaved and the razor immediately applied. The amount required varies somewhat with the texture of the skin and hair, but a little practice gives the necessary indication. The material has been in use in St. Thomas's Hospital for about twelve months, and gives satisfactory results. For shaving in the hospital, apart from surgical preparations, its use is compulsory, unless the patient provides his own brush and soap, so that the transference of skin disorders, apart from general septic contamination, is reduced to a minimum.

Samples of the paste in collapsible tubes were examined by the

PRESIDENT, who said that, although it hardly came within the purview of ordinary pharmacy, the preparation would prove extremely useful in surgery.

Mr. E. S. PECK paid tribute to the excellence of Mr. White's paste as a result of personal experience, and Mr. White was thanked for his paper.

### A GENERAL METHOD FOR DISPENSING COMPRESSED TABLETS.

BY EDMUND WHITE, B.Sc., F.I.C., AND R. A. ROBINSON, JUNR.

The use of compressed tablets in medicine has hitherto been limited almost entirely to stock formulæ, owing to the difficulty of dealing with different materials for compression in some general way comparable to the use of simple excipients in pill-making. The general method of granulation before compression, although satisfactory for the manufacture of tablets in large quantities, is too troublesome for the production of two or three dozen tablets, according to any special formulæ. Several inexpensive tablet machines suitable for dispensing purposes are now on the market, and we have been experimenting for some time with the object of finding some simple method of general application which shall enable the pharmacist to produce, say, one dozen compressed tablets as easily and rapidly as he can produce the same number of pills. Finely-powdered material does not usually flow rapidly and uniformly in the die cavity, or cohere in tablet form without great pressure. The adhesion of the material to the dies is another source of trouble, and the rapid disintegration of the tablet in water must also be an attribute of any method of general application. The method which we have found to yield satisfactory results with materials of all varieties is as follows:

Melt one part of oil of theobroma, and add three parts of starch in powder. Stir thoroughly while continuing the application of heat, and when uniformly mixed allow to cool. This mixture constitutes the general excipient. For the production of tablets add this excipient to the material to be compressed, so that the mixture contains from 5 to 10 per cent. of oil of theobroma. The oil imparts a somewhat granular character to the mixture, sufficient to enable it to flow easily and uniformly into the mould, and compara-

tively light pressure produces a tablet which may be dropped without fracture, and at the same time may be crushed to powder between the fingers or disintegrated rapidly in water at body temperature. We are not prepared, with our present experience, to state that this method is so good as granulation for the manufacturer, but it enables one to dispense tablets from a prescription with the ease and simplicity of dispensing pills. By this method the time and trouble involved in damping, sifting, and drying, incidental to the method of granulation, are entirely avoided, and lubrication of the moulds and dies during compression is, in our experience, unnecessary. Similar results may be obtained by using paraffin wax in place of oil of theobroma, but the latter appears to be more satisfactory, probably owing to its lower melting point. The mixture of medicament with the starch-theobroma excipient should be quite cold before beginning the compression, otherwise it has a tendency to adhere to the parts of the machine. As a general rule, 4 grains of material require 1 grain of the excipient, but if much sugar be present rather more must be added.

Mr. J. C. UMNEY thought the method would not answer in making tablets of citrate of lithia or other soluble salts. A turbid solution would, he thought, be produced.

Mr. N. H. MARTIN asked whether the substances used would have to be in fine powder.

Mr. G. F. MERSON inquired whether each quantity was weighed, and whether automatic feeding were possible in all cases with the universal excipient recommended by Mr. White.

Mr. PETER MACEWAN said the point of the paper lay in the fact that it corroborated the suggestion of Mr. Stewart Hardwick at the Liverpool Conference, to use a mixture of cocoa-powder in dispensing tablets. Mr. White's formula appeared to have the same advantages, and it possessed the further inestimable advantage of being colourless. He considered that Mr. White had done good service to dispensing pharmacists in the evolution of this formula. Perhaps it would not be suitable for manufacturers in all cases, but the wholesalers were quite capable of looking after themselves.

The PRESIDENT, who exhibited samples of phenacetin tablets made by Mr. White, pointed out that they were excellently made, and quite colourless. The latter was the great desideratum. With regard to substances like citrate of lithia, he could quite understand that there would be difficulties, but that made little differ-

ence, as the formula would be perfectly applicable to nine-tenths of the substances to be compressed, and it appeared to afford a desirable and easy way of making tablets for the retail pharmacist.

Mr. WHITE replying, said the machine he used was an automatic feeder, with which he could make about ten tablets in a minute. The powder was simply mixed in a mortar and fed into the machine, and by his method he could make 2 lbs. of mercury with chalk into tablets without trouble, and they might make 30 lbs. Some machines would probably not produce so satisfactory results with his formula, but in that case he thought a machine should be obtained to suit the powder, and there were many with which it answered perfectly well.

### LIQUOR THYROIDEI.

By EDMUND WHITE, B.Sc., F.I.C.

Several observers have drawn attention to the unsatisfactory keeping properties of this preparation. Even if prepared with the most scrupulous care, it does not remain good for long, the proportion of phenol being too low to prevent the development of putrefactive organisms in the fluid. It would appear somewhat strange that this should occur in a menstruum composed of equal parts of glycerin and water, because such a mixture will preserve most organic substances from decomposition; but the fact has been overlooked that the water present in the fresh thyroid glands reduces the proportion of glycerin in the finished product below that which is capable of preserving it. According to the official directions, for each gland one adds 2 c.c. each of glycerin and 0.5 per cent. solution of phenol. Fresh thyroids contain about 75 per cent. water, and, taking the average weight of a gland (two lobes) at 8 Gms., it is clear that when the official directions are followed the fluid actually present will consist of 2 c.c. of glycerin and 8 c.c. of water. The preservative action of glycerin in this proportion is almost nil, with materials so liable to putrefaction.

With the following modification one may obtain a preparation which keeps perfectly well, and is quite free from objectionable odour, a sample which was prepared in April of this year having kept perfectly well in a corked bottle on the dispensing shelf:—

Trim the glands and weigh them, slice and bruise them, and for every 20 Gms. of tissue add 15 c.c. of glycerin. Macerate for twenty-four hours, strongly express, and make up the expressed

product to the required volume by the addition of a mixture of equal parts glycerin and water.

This procedure is based upon the assumption that the fresh thyroid tissue contains 75 per cent. of water, an assumption justified by the drying of a large number of samples in the water-oven at 100°C. The fluid present in the preparation will then be composed approximately of equal parts of glycerin and water by volume, and with this proportion the addition of phenol, chloroform, or other antiseptic is quite unnecessary.

Mr. BIRD commended Mr. White's paper as most practical and useful. The presence of water in the glands accounted for all the trouble that had been experienced with this preparation, and was one of those things which, immediately Mr. White pointed it out, excited wonder that such an important fact had been overlooked.

The PRESIDENT characterized the paper as one of those practical efforts which show the wisdom of the Conference meetings, and the advantage of having contributions from thoroughly practical men.

#### ON TASTELESS CASCARA PREPARATIONS.

By EDMUND WHITE, B.Sc., F.I.C., AND R. A. ROBINSON, JUNR.

After experimenting with numerous published formulæ for disguising the bitter taste of liquid extract of cascara, we arrived at the conclusion that none of the products were very satisfactory. The experiments were undertaken with the object of selecting a formula for a cascara mixture suitable for adoption in the *St. Thomas's Hospital Pharmacopœia*, and the various mixtures were subsequently set aside and almost forgotten. Some weeks afterwards, before throwing away these mixtures, one of us happened to taste some of them with the intention of confirming our original impressions, and found that the bitterness had almost or entirely disappeared in certain samples. This result was most marked in those formulæ which contained some aromatic spirit of ammonia, and this suggested the idea that the alkalinity was a potent factor in bringing about the disappearance of the bitter taste. The non-bitter mixtures were tested clinically, and found to be still active as purgatives. The experiments were repeated with other samples of extract, with similar results. We then exhausted some



cascara by percolation with water, and divided the percolate into three parts. The percolate was strongly acid to test paper; one part was rendered strongly alkaline with potassium hydroxide, another with strong solution of ammonia, and the third with sodium bicarbonate, using the alkalies in equivalent proportions. The three products were evaporated, and after about three hours were rendered tasteless, the evaporated products being dark and clear and miscible with water without precipitation. The products were all active, although from the inherent difficulties of such observations it could not be definitely stated that their activity was equal to that of the original bitter extract. On looking up the literature of the subject we found that we had been anticipated to some extent by E. Aweng (*vide* abstract in *Pharm. Journ.* [4], 12, 191, from *Oesterr. Zeits. für Pharm.*, 55, 6), who recommended the evaporation of the percolate after addition of ammonia, precipitation of the bitter substance with lime, and subsequent removal of the excess of lime by means of tartaric acid. In our experience this treatment may be simplified by adding for each 100 c.c. of finished extract 5 Gms. of potassium hydroxide or 7 c.c. of strong solution of ammonia, heating on a water-bath for three hours, or until the bitterness has disappeared, and finishing off the product in the usual way. Sodium bicarbonate was found to be less effectual than potassium or ammonium hydroxide.

In the present state of our knowledge concerning the active principles of cascara it is difficult to give an explanation of this behaviour of the extract towards alkalis, but the results would appear to indicate that the bitter substance may possibly be an anhydride or lactone, which in the presence of an alkali is converted into an alkaline salt, devoid of bitterness, while still retaining its purgative properties. If the percolate be exactly neutralized by alkali and a slight excess of alkali added, the acid reaction returns on standing, and more quickly when warmed. The addition of a small quantity of alkali may be repeated with a like result several times, but if the percolate be rendered strongly alkaline at once the bitterness disappears rapidly and completely. This shows that the conversion of the bitter substance depends upon the degree of alkalinity, and is suggestive of the view propounded above. The addition of lime or magnesia to the powdered bark before percolation was formerly recommended for the production of tasteless extracts, but such products appeared to be weaker than the official bitter extract. If experience shows that the product obtained by treating the bitter extract with potash or ammo-

nia retains its activity unimpaired, it would indicate that the calcium or magnesium salt of the purgative principle, being insoluble in water, is retained in the marc, while the potassium or ammonium compound is soluble and still active.

We found that 100 c.c. of the sample of the official extract taken from stock required 0.72 Gm. of potassium hydroxide for neutralization. If  $\frac{1}{10}$  of this quantity of alkali was added to the neutralized fluid and the product warmed, the acid reaction returned, and this addition of alkali and warming was repeated twenty times, involving the addition of a total quantity of alkali of 2.16 Gm., and heating for over thirty hours without a permanent alkaline reaction being obtained, or entire loss of bitterness. If, however, 5 Gm. of potassium hydroxide was added all at once, the bitterness rapidly disappeared on warming, and the product was left slightly alkaline. The time required for removing the bitterness thus appears to vary inversely with the proportion of free alkali present, a result most easily explained by the assumption that the bitter substance is an anhydride or lactone.

Mr. NAYLOR said the early part of the process now recommended was not quite novel, as it was used in making cascarn.

The PRESIDENT said last year they had been told how to cover the taste of cascara, and now how to remove it. He hoped the result would be that the million pounds of the drug annually consumed would be increased.

The authors were cordially thanked for their paper.

At this point the meeting was adjourned until the following day.

### WEDNESDAY, AUGUST 13.

The PRESIDENT took the chair at 10 a.m. Before the commencement of the business he said that, as probably many of them were aware, the Conference had indirectly sustained a severe blow since the previous day. One of the reporters—Mr. Duncan—who was well known to many of them, had had a very sad bereavement. His daughter and son were yesterday bathing at Crail, and both were drowned. He (the President) thought it only right to mention this, and he was sure they would all wish to tender their thanks to Mr. Duncan, and through him generally

to the reporters, who had aided the Conference, for the admirable way they had done their work in previous times. He was sure he fulfilled all their wishes in tendering their great sympathy with Mr. Duncan in the very tragic bereavement he had suffered.

The following paper was then read:—

### THE EDUCATION OF PHARMACISTS.

BY C. R. MARSHALL, M.D.,

*Professor of Materia Medica and Therapeutics in the  
University of St. Andrews.*

It is a common failing among men to speak with authority upon subjects with which they are ill-acquainted, and I feel that I am showing this frailty of humanity in speaking on this difficult question. But sometimes a gleam of light is thrown by an unpretentious opinion; and it is rather with this hope than with any desire to lead the way that I have offered this paper. In it I shall confine myself to the training of pharmacists as such. The education of students previous to registration can safely be left in the hands of the proper authorities.

The training of pharmaceutical students, it seems to me, can be considered under three heads:—

- (a) Simple apprenticeship, under indentures or not.
- (b) Apprenticeship, followed by coaching.
- (c) Apprenticeship, combined with a collegiate education.

This is not a good theoretical classification, but practically it is sufficient. The main difficulty turns upon the meaning of coaching and of collegiate education. For the purposes of this paper I shall define coaching as the rapid introduction of necessary facts into the mind of a student by a so-called teacher for a specific purpose—in this particular instance the passing of the Pharmaceutical Society's examinations. This, for the pharmaceutical student, is the immediate, if not the main goal of life. The method is comparable with cramming; and the two are usually combined. I am inclined to believe that this is by far the most popular method of getting through; and I am also inclined to believe that it is the one which most often courts disaster. How any one can undertake to teach within three months all the subjects of the Minor Examination is to me a mystery. It cannot be done. The mind requires a certain length of time for the assimilation of

new facts, and it requires carrying from the simple to the more complex by easy stages. Only in this way can any one be really taught. The acquisition of a number of facts without logical connexion is not education, any more than the disjointed parts of an apparatus is the apparatus itself. But I will say no more on this question. I have no good word for it. I think it is sapping the life of your profession, and is tending to develop a race of business men little removed from the most unprofessional callings.

I have assumed that the student has passed his years of apprenticeship, as is so often the case, in acquiring the rudiments of the business. Very rarely, nowadays, is he prepared to pass the Minor Examination at the end of his time. And, in part, this is his master's fault. In too many cases, I fear, are apprentices looked upon as cheap labour. Little time is given them for study; little care is taken to explain the processes they are asked to perform; and but little practice is given them in that most important branch of their education—the art of dispensing. This is not as it should be. A pharmacist, whatever the terms of agreement, is morally bound to teach his apprentices to the best of his ability, not simply the wrapping up of bottles or the ingredients of a few worthless recipes, but the principles on which his art is founded. But even where this is done there still remains much that an apprentice cannot conveniently do. Practical chemistry is a case in point. Few pharmacies are adapted for acquiring a knowledge of this subject, and hence it behoves him to seek his knowledge elsewhere. This he should be recommended to do. He is thereby stimulated to take an active interest in his examination work, and at the same time to acquire a knowledge which, gradually obtained, tends to remain with him long after the needs of examinations have passed away. I would much rather employ a man thus educated than one who had simply passed through a cram school, however brilliant his career. (I am not, of course, referring to students who employ these to refurbish their minds previous to examination.) But to attend classes of this nature means a certain amount of time. It is useless to expect a youth who has worked in a shop the whole of the day to be able to assimilate knowledge late at night. Either he must have a rest previously or he must attend classes earlier in the day. In any case, a certain amount of time for study should be allowed and even enforced.

It is, of course, impossible to lay down rules to meet all cases

The terms of apprenticeship, the class of apprentices, and certain other factors differ, not only in different, but in the same parts. And this, and much more, makes the problem of pharmaceutical education a very difficult one. So far, what I have tried to impress is the duty of a master to an apprentice. He should advise him in his studies, allow him the necessary time for them, as well as for recreation, and should teach him as far as he can the principles of pharmacy. An apprentice should, in fact, be fairly equipped for the Minor Examination when he has served his apprenticeship.

In a large number of cases, especially in a country town, it is impossible for an apprentice to attend classes during his apprenticeship. In that case the only way is to attend a properly-conducted systematic course at a thoroughly equipped institution afterwards. And this, I have no hesitation in saying, should extend over a year. This is what I mean by a collegiate education. It is knowledge properly and systematically acquired, not simply a means to an end, unless this is the acquisition of knowledge itself. Of this method in its complete form I do not wish to speak. It has been advocated by others better acquainted with the facts than I am, but I do not wish to advocate another view which, for Scotland, at least, has now become possible. I did not know that it had previously been suggested, but recently I have been told that it is already at work in Philadelphia.

I have referred to the moral obligations under which a pharmacist labours with regard to his apprentices. These, I suggest, should be transferred to the schools. In other words, that a would-be pharmacist should be properly trained previous to his apprenticeship—trained not only in botany, chemistry, and physics, but also in all that is comprised under the term pharmaceuticals. How this may be done I will trace in outline.

Much has been said lately of a degree in pharmacy which should be limited to pharmacists and called B.Sc. (Pharm.), and with this many of us are in sympathy. Indeed, I see no great difficulty in the way. But before proceeding I should like to say a few words regarding it. What I have to say is not in any sense authoritative; it is simply my own views on the matter, and I trust it will not detract in the slightest degree from the good work done by Mr. Tocher. In the first place, I should delete the word "pharm." It is unnecessary and cumbersome, and, as it is not a mark of greater distinction, it would not be employed by those who were entitled to it. The Universities do not apply such distinctive titles to their degrees. We do not speak of a B.Sc.

(Engin.) or a B.Sc. (Agric.); they are simple B.Sc.'s in applied science. And it would be better for the pharmaceutical degree to come under the same head. The regulations would then be the same as for any other degree in applied science. There would be the same preliminary examination and the same First Science examination, the former being passed before matriculation, the latter at the end of the first year. The two succeeding years would be devoted to the subjects of the final examination—chemistry, botany, and pharmaceuticals, the last being taken on the higher grade, thus making the degree an honours degree. The botany would comprise all that is required for the Major Examination of the Pharmaceutical Society, and the chemistry and pharmaceuticals, this and something more. As regards pharmaceuticals, with which we are most concerned, I can best summarize what I wish to say by giving a synopsis of a possible examination. It is as follows:—

#### FINAL EXAMINATION.—PHARMACEUTICS.

- (1) *Materia Medica*.—Paper, *viva voce*.
- (2) *Pharmacy*, including law relating to scheduled poisons.—Paper, practical (the making of pharmacopœial preparations, dispensing, etc.).
- (3) *Pharmaceutical Chemistry*.—Paper, practical (the preparation of pharmacopœial substances; assaying, etc.).
- (4) *Toxicology and the analysis of foods and drugs*.—Paper, practical.

Into this scheme I do not propose to enter fully at present; but to give an idea of the suggested course I have appended, in a footnote,<sup>1</sup> the time drawn up by Professor Walker and myself, which might be spent on the several subjects during the curriculum. The plan is, without doubt, open to criticism; but on the whole it seems to me the best. I would like to see pharmacists, as they ought to be, the complements and help-meets of medical men, and

<sup>1</sup> Elementary chemistry: Lectures, one hundred hours; practical, one hundred hours. Elementary physics: Lectures, one hundred hours; practical, fifty hours. Elementary botany and zoology, each: Lectures, fifty hours; practical, one hundred hours. Advanced chemistry: Lectures, one hundred hours; practical (including water analysis), three hundred hours. Advanced botany: Lectures, fifty hours; practical, one hundred hours. Pharmacy: Lectures, fifty hours; practical two hundred hours. *Materia Medica*: Lectures, fifty hours; museum work, variable. Toxicology: Lectures, twenty-five hours; practical, fifty hours. Analysis of food and drugs, one hundred hours.

this can only be attained by following such a course as has been suggested.

And this, I think, can be successfully accomplished prior to apprenticeship. Indeed, I think this is the most opportune time. At the end of his school days a youth is more capable of being educationally trained than after years of apprenticeship, when the mind has lost some of its elasticity, and interest in other things has been aroused.

After his college career a student who wished to proceed with pharmacy would naturally enter a shop as apprentice. But the apprenticeship should be different in form from the present. The student in a sense is a skilled workman, and consequently worthy of his hire. All that he would require to know would be the routine of business, and this should be accomplished in a comparatively short time—in two years, at the most. At the end of this time he should be entitled to pass the Pharmaceutical Society's examination and afterwards to register.

This brings up a second point in connexion with the degree. It is suggested that it should be limited to pharmacists. This, I think, is a mistake. Not being a registrable qualification, it should be open to any one. It is very unlikely that any but those going in for pharmacy would take it, but it might prove useful to public analysts and others who desire a degree in these special subjects. But that, far from diminishing its value, would considerably enhance it to pharmacists. Indeed, with such a training, there is no reason why pharmacists should not take up work of that kind.

I feel that I have still much to say upon this subject, but I must forbear. One important point alone calls for consideration, and that is the question of expense. Is the remuneration worth the expenditure of time and money? I think it is—in Scotland, at least. Here, through the munificence of Dr. Carnegie, the college fees are paid, and with a little extra work a bursary, which will keep a student in books and clothes, can, without much difficulty, be obtained. The loss to the parents is therefore minimal, and, coming soon after the school days, is more easily borne. After leaving college a student ought to be able to keep himself, and no other expense need fall upon the family.

Of the advantages of a university degree I need hardly speak. The knowledge acquired, apart from anything else, is a pleasure in itself; and it is an incentive to research which is so much needed in every department of a pharmacist's profession. I also believe

that it will lead to better remuneration, both directly and indirectly, and ensure a better social status and a happier life.

It only remains for me to state that the argument I have put forward still holds good, apart from the question of a degree. The collegiate training of a youth is best done, and in many cases most economically done, before he enters upon his apprenticeship.

Mr. ATKINS (Salisbury) said it afforded him very great pleasure indeed, not to move a vote of thanks, but to express his personal congratulations to Professor Marshall for his exceedingly thoughtful paper on a question which he thought was very germane to their meetings as a Conference. Long years ago this question was taken up at an earlier Conference, and, according to the light of that day, opinions somewhat different from those of the Professor were then expressed and largely enforced; but times had changed since George III. was King, and with the evolution of that change they must learn to adapt themselves. While he thought the Professor had given them abundant material for reflection, he was, very largely, he might say, in accord with him, and the desire he had long cherished was that much good work, scientific work, should be done by the apprentice before his indentures were signed. In earlier days they limited that preparation largely to scholastic or to mere classical training, but the Professor that morning had carried the argument much further, and he laid stress upon a training in science before apprenticeship began. He was not surprised that this was given expression to in Scotland, which he ventured to say as an Englishman was a generation ahead in the matter of education. They in England were slowly learning by what they saw north of the Tweed, and he would only say in regard to preparation that there were practical difficulties in small provincial centres in the way of carrying on this scientific training in the country. It was all very well to say—he did not think the Professor said it—that every master was responsible for this training. Parenthetically, he would say that this whole question of apprenticeship was passing through the crucible of change, and therefore, largely, the men best qualified to train now declined to train, and what the Professor had aptly called cheap labour was a consideration in the South, if not in the North, in regard to securing apprentices. That was a barrier in the programme in regard to apprenticeship. Now could it be applied outside the educational centres? Well, in the larger towns and communities he thought it could be, and ought to be done, and he



thought the employer should make arrangements for his apprentices availing themselves of the opportunity in university and other towns where there were facilities. But that did not apply to small populations; and so he feared they must come back to this, that while they insisted on sound preparation as far as they could secure it—scholastic training at school and business preparation in the pharmacy itself—in many places it must be that scientific training must be limited to training in future days in their schools. In regard to those schools he was entirely in accord with Professor Marshall in what he had said about “cram,” which was the reason why there was such distressing slaughter in their examination rooms. That fact had come prominently before him. It seemed to him that there could be no remedy for that growing evil but one of slow, steady, and sound acquisition of knowledge—call it by what name they liked. If they called it a curriculum some would take objection to it. He did not care what they called it, he only wanted the reality, and the only preparation for examination and, what was of infinitely more importance, for the sequence of life after the examination-room, was the sure and steady acquisition of that knowledge requisite for the practice of pharmacy.

Mr. NEWSHOLME said he would like, on this subject, to say one or two words, but he was exceedingly sorry he was not present at the commencement of the paper, for that prevented him from discussing it so freely as he would like. He had the greatest sympathy indeed with the views expressed by Professor Marshall, and he thought his friend Mr. Atkins had covered the most of the ground which he (Mr. Newsholme) would have liked very much to have covered. But members of the Council of the Pharmaceutical Society, and especially of the Boards of Examiners, knew very well the enormous difficulties of the men who came up for examination. They, in their capacity as Councillors, had been doing their very best for a great number of years to try to bring about some systematic course of training for the students before they came up. One realized well—he thought he had realized it more since he came to Scotland—what education meant, and how much easier it was to put a system of education in force there than in England. The manner in which the business of pharmacy was conducted in Scotland was a different thing altogether to the business carried on in the large manufacturing cities of England. Here he knew Professor Marshall had a mission to a sympathetic audience, which was likely to agree largely with his views; but he was not quite sure that if the Professor had gone to Sheffield or

some of their manufacturing towns, people there would have appreciated the words he had used that morning. Those of them who had been interested in education so long would like to see his views carried out. But there was another side to this question, and some people might say *cui bono*? What good is the training and the amount of money to be spent on students before entering into apprenticeship, and the time the chemist must devote to his apprentice? What was it for; what did he gain afterwards? He knew Mr. Atkins and others would say "Education itself is a grand thing." He believed in that thoroughly; but nowadays they wanted more than education; they wanted some privilege, some protection. It would not do for any one in that room to dwell upon that side of the question, because he saw that Professor Marshall had been treading on dangerous ground by reading this paper before the Conference. Therefore he would not follow up that argument. But he would like to follow out what had been said by Mr. Atkins in this direction—that there was a good time coming when education, even in England, would be on a much better footing than at the present time. They had, first of all, in their large cities, like London, Liverpool, Manchester, Birmingham, and Sheffield, great University colleges springing up all around, and many of the young pharmacists coming forward, or would-be pharmacists, were availing themselves of opportunities afforded them. Now they were bringing a system of education into their towns and villages. The County Councils in England were doing their very best to promote some system of education, and even in small villages where there were parish councils—small bodies—they said the time had come when the pharmacist did require some systematic course of education. He ventured to think that if the remarks that had been made by Professor Marshall were taken to heart, and applied not only by great Universities, but by County Councils and others throughout the counties, some good would come of it. In regard to the question, *cui bono*, which he had put, he might say that he was one of those who believed firmly that the better the pharmacist is educated the better a chance has he of maintaining his position, and rising to something better.

Mr. WATSON-WILL said he came rather late, having some business to see to in the morning, but as he came in he heard Professor Marshall make a statement in regard to the examination which was very important. That remark was that they should have papers as well as *viva voce* examination. When

a student had passed through a certain course of training, he thought it was right that the knowledge he had acquired should be thoroughly taken up. When one considered that the student had only three hours of an examination to go through the subject, he thought it was evident that that was insufficient—it was impossible to obtain from the candidate anything like the amount of information he had accumulated during the period of his course of tuition. The time was too short, and, speaking personally, from what he knew of the examination, and that part of the examination which he thought told most forcibly on all the candidates, that it was not a thoroughly practical examination for the profession which he was called on to carry out. He had known, as a fact, of candidates being asked to prepare two fluid drachms of hypodermic injection of morphine according to the British Pharmacopœia in 1885 in a five-ounce measure. It took about the half of that to wet the measure. It was impossible for a candidate to turn out a good result under such conditions. While one must necessarily pay great attention to the educational part of the examination which a candidate was to be put through, it was equally true that the examination side of the question should be considered. The fault was not always, he thought, on the side of the candidate, for sometimes the examination was conducted in a place in which it was impossible that he could go through the examination as it should be. He referred to the state of things twenty-four years ago; but things had advanced, and the professional education was now taught on an absolutely different footing from what it was twenty-five years ago. The result was that they got candidates better prepared from a scholastic point of view. One of the most difficult parts of a student's career was to teach him the rule of three, which perhaps one did not look for in the ordinary pharmacy training. But at the same time, as he had said, Scotsmen were in advance of England in educational matters most decidedly. He thought it was very necessary that an intending pharmacist should have a certain amount of scientific training before he entered upon his apprenticeship, though only elementary. His feeling was that they did not possess that, and certainly did not acquire it during apprenticeship. It was not altogether, he sometimes thought, the fault of the apprentices, for there were apprentices and apprentices, just as there were masters and masters. He was speaking now from experience of his own students. When a man had gone through the University training or a technical class, that man would turn out a much superior student all round. He had laid

the groundwork, and had practically to acquire the pharmaceutical aspect of the question. He thought if their Universities knew the difficulties when they advertised classes for pharmacists they would really look at the actual pharmaceutical requirements, and teach a class of chemistry or materia medica that was in keeping with the synopsis of the examination.

Mr. JAMES MACKENZIE (Edinburgh) said that he heard the Professor's very excellent paper, and the remarks from their friends, from the south of the Tweed, with whom he entirely agreed. He would make a remark or two from the other side of the Tweed. There was no question more important to pharmacy than the question of education, or one bristling with more difficulty in all its aspects. Apprentices were reared under very different conditions; consequently they differed as greatly as might be. He feared they were apt to look at chemists' apprentices as postage-stamps or coins freshly from the Mint—as if they were all the same. He went largely by what Professor Marshall had stated, but he was afraid there was a difficulty, just for the reasons he had stated. Another point was that they were dealing with a condition of things that was presently more theoretical than practical. They were going through a crucial condition, as the professor had stated, they wanted an inspector who should go round and see the laboratories in which the young men were to be put through their examinations, that all necessary appliances were there. Another point was that the young men should not go up for licences from the Pharmaceutical Society until they understood that there was remuneration to represent that amount of examination, which did not exist at the present time. He called attention to the circumstance that in the University of Edinburgh it was the fact that the late Professor Hope and others taught chemistry and pharmacy together.

Mr. THOMAS MACKENZIE (Inverness) said this question of education could be carried a little too far, especially at the present stage. There were three factors that should determine their attitude towards this question. There was, first, the material they had to work upon—the apprentices; secondly, the condition of pharmacy; and, third, would this higher education tend to consolidate the craft and raise the status of the pharmacist and his position generally in the eyes of the public? The material hitherto had been of the crudest description, but that crude element would be gradually removed, due to the abolition of the old preliminary and the introduction of the stringent entrance examination, and

they might look for better apprentices coming into the trade. Then, secondly, as to the condition of pharmacy embraced. What had they to offer students for giving them an apprenticeship? They could not expect apprentices at present at enormous expense to go through their examinations if, after their apprenticeship, they should find that they were not to be envied, and were not to have the coveted rewards that were to be found in other professions and trades. In the third place, he believed that this higher education would tend to consolidate the craft, and that they were in the right direction by improving the educational possibilities of the pharmacist. But, on the other hand, they must not leap too far at once, but make a gradual and systematic progress. In regard to Professor Marshall's scheme, that before entering apprenticeship a student should possess a scientific knowledge of chemistry, and so on, and then take a two years' training in the shop, would be of no benefit to his employer; he might as well go into a technical college, take a four years' course of instruction and finish, and be turned out an assistant.

Mr. GILMOUR (Glasgow) said his sympathies were all with the doctrine of Professor Marshall's paper. There were one or two questionable statements in it that seemed to him perhaps excusable on the part of one not intimate with the inner history of pharmacy. The system of education at present was obviously in a transition state owing to the perverted state of the Pharmacy Act, which declared that the assistant and not the employer was the seller of poison. That had precipitated matters. He believed pharmacy was growing and developing, but there was no machinery to meet the condition of things. That was the explanation of the abnormal state of matters. Some were negligent and incapable men as masters; they began such and continued so throughout their lives. But they must not forget that there were capable and conscientious masters who did their best for their apprentices. They must remember the condition of the trade in many English centres, where the pharmacy was a general store and little else. In Scotland there were parts where a prescription was a phenomenon, such a phenomenon that everybody in the shop was called in to look at it as a curiosity. That was no exaggeration. He was speaking of it from experience. Under such circumstances how was a master to instruct his apprentice? Was he to give lessons in dispensing at his own expense? These things had to be taken into account. Personally he thought the preliminary examination should be taken in every case before the apprentice-

ship began. Formerly the examination was a special examination, and they did not care to ask apprentices to take it because it tied them down, and it would have been unfair to ask any one to take it until they found that he was good for the trade, and that he was suited for them. Now that there was a general entrance examination, which made the student eligible for several professions, there was no hardship in asking him to take it before the apprenticeship began. He thought it would be better to take the qualifying examination *pari passu* with the training in the shop. He thought they might have a far more academic education than at present. His view was to have it on the same footing as on the Continent, though they held there that the tendency was towards a divorce between theory and practice, which must be guarded against here. They had this difficulty, and he was hopeful that they would be able to overcome it. His hope was that they would reach what Professor Marshall aimed at. They should not think so much of remuneration. Mr. Atkins struck a true note when he said that the aim of the future pharmacist would be to cultivate his mind and to improve his status, and all the rest would be added unto him. He thanked Professor Marshall for his paper, and thought he had been sufficiently rewarded by the interesting discussion to which it had given rise.

Mr. MARTIN asked what was the length of the curriculum suggested by Professor Marshall—was it three years?

Professor MARSHALL said he had spoken of the education for a degree as an example, but he would say two years at least. This would require three years; but he thought the elements of pharmaceuticals might be acquired, by those not proceeding to a degree, in two years.

Mr. MARTIN said that so much had been said about education that he would not detain them, but being, unfortunately, from the south of the Tweed he was sorry to hear that in the country from which he came pharmacy or a pharmacist was a *rara avis*. However unfavourable the education was, or however negligent the masters, he thought he had come across a great number of men, and that there were a great number in England, who were pharmacists in the true sense of the word. That was to say, they knew about drugs, and what they did not know about drugs could not be taught in any University in this kingdom, not even north of the Tweed. He did not agree with Mr. Marshall, whether speaking from a large experience of employing men with an academic training, and that only, or of employing men for training

as pharmacists—he did not agree with him, though he knew it was a moot point that all men had to do with in regard to a student coming straight from an academic education. There was a practical side, but the theory on which the practice was based was of a commercial value, and he advocated the commercial side. They had the case of medicine, in which the apprenticeship had been abandoned. There the students went straight from the University or technical school to their scientific training, and he had met, not one or two, but scores and hundreds of medical men who said that the year or two of apprenticeship with a medical practitioner had been lost to them, and that some after going through their medical curriculum had taken their degrees to qualify them, but had had to learn their business afterwards. He thought in their preliminary examination they should insist on better education, and the examination, which would correspond with the matriculation for the University degree, should be passed after the student had left school. Then if he was an intelligent student he should be taken into pharmacy, where drugs were handled and manipulated. He did not agree with Mr. Gilmour that dispensing consisted of taking a medical prescription and putting the ingredients together. The qualification began in distinguishing one root from another. An apprentice could learn a good deal in the first two or three years. He learned to be patient, he would wash bottles and handle measures if he was gifted with the faculties of observation, but when he came to the pharmacist from the University, if he had been nowhere else he was far too big a man to learn—he shook his head. He had had, and at this moment had, both classes in his employment. They could not ruin some men, whatever kind of education they gave them, but with others too long contact with the scholastic side simply spoiled them for practical life. The best pharmacists he had known were those who combined the practical side of pharmacy with a keen intellectual zest for theory. It was almost beyond his imagination that a man with a good training, if he was brought in contact with pharmacy, with all that stimulated his intellectual faculties, could not go through his training and super-impose his practical training which made him a complete pharmacist. He would not take as his apprentice a man who had a B.Sc. degree in the University. No man could be too much conversant with all departments of his business, and the deeper problems they must leave for the specialist, of whom they had more than one in pharmacy. He sympathized very much with the theoretical side of the

question. As one who had seen a great deal of the practical side of pharmacy, he did not take the view that the pharmacist in England was a *rara avis*, or that it was wise to adopt University training for the supply of the future pharmacist.

Mr. PECK said it seemed to him that they had covered a great deal of ground that morning, and there were many things which one would like to say a word or two about, but time would not permit. As one more or less responsible for the discussion through correspondence with Professor Marshall, he thought their thanks were due to the Professor for coming among them, and giving them his time that morning, and he hoped that he would feel gratified by having induced such a lively discussion. He wanted at the outset to correct one error that one member had made. Mr. Watson-Will had told them of an incident in the examination-room, of a man being asked to prepare two fluid drachms of hypodermic injection of morphine in a five-ounce measure. That might have happened some years ago, but it was absolutely impossible it could happen to-day; and he would like to make it quite clear to future candidates that they would get all the apparatus they required at the present day, and the only difficulty was for them to know how to use it, apparently. One point about Professor Marshall's remarks was just this: That if men had had a good preliminary training, and then gone on to the University for two or three years, he rather doubted whether they would feel inclined to take up pharmacy afterwards. He concurred with Professor Marshall in his concluding remarks that a degree would help to encourage and stimulate research, and possibly would come later on to better the remuneration and raise the social status of pharmacy.

Mr. PAYNE (Belfast) said they had heard a great deal about the dulness on the south of the Tweed, and the cleverness on the north of the Tweed; but they had heard nothing of pharmacy or practice on the other side of the Channel. He thought the subject brought under their notice to-day was most interesting. The getting of suitable apprentices was one of the greatest difficulties they had to contend with at the present day. He feared that in a great measure that was due to the pharmacist in the first place. Consequently, he thought that when an apprentice was taken, he must be taken with a distinct understanding that indentures should not be signed, or if signed should be cancelled, if he had not passed through his matriculation examination. And he would strongly urge that rather than take the general examination.



Dr. COULL expressed the opinion that apprenticeship should come before academic education. He had often been thankful that he had learned to dust bottles and clean shop-scales before he went to the university.

Professor MARSHALL, replying on the discussion, said he had to thank the Conference very much for the way they had received his ideas, and also for the discussion that had ensued thereupon. There was evidently an idea abroad that he had no practical acquaintance with the subject. He had to tell them that it was only by mischance that he was not sitting on the benches among them and being one of them instead of trying to give them some ideas upon the matter under discussion. For a year he had happened to be in a chemist's shop in one of the large towns in the West Riding of Yorkshire, and, as he had said, it was only by a mischance that he did not go forward to examination and become one of them. It would thus be seen that he had some little practical acquaintance with this subject. He could only hope to give a few ideas of what he thought, and what he believed the education of pharmacists would come to, and what he believed it was coming to. They were in the condition of the medical profession in the early part of last century, when apprenticeship was absolutely necessary. Very few now would go back to the apprenticeship system—in fact, he believed that none of their best men had been in a condition of pupillage previous to going on to a university education. Further, there seemed to be an idea abroad that a man who had been trained in a university would not go into a pharmacy afterwards. He thought that was a great mistake. In the university they did not simply stand and deliver lectures to the students before them, but they did all the practical work connected with their profession. They cleaned up bottles sometimes—they certainly cleaned all their measures; they learned to weigh and wrap up bottles—in fact, they did everything that was done in a shop, and did it in a properly systematic manner. He had every sympathy with Mr. Martin, and quite understood the point of view he was labouring under, but at the same time he did not see how the knowledge which was required generally was to be obtained in a pharmacy at the present time. One gentleman had spoken about a prescription being an extremely rare thing—so rare in fact, that the men at the counter came to look at it. He taught dispensing to his own medical students, but only that they might know how to prescribe.

And in his own classes they started with the simplest things, and went on by gradual stages to the more complex. This he thought was the proper method to learn dispensing, and he asserted that a man, if he had completed his curriculum, ought to be able to dispense any prescription sent out by any physician, however learned or ignorant he might be. Concerning the remuneration of a man who had passed through a college course, it was not too much to say that he ought to be worth his keep. He did not think such a man would hesitate to do anything in a shop except very menial work. The same thing applied in engineering. So far as he knew, one did not experience any trouble with an engineer because he had had a university education.

He would not longer detain them, but only say that he had stated his ideal of a pharmaceutical education. It was his ideal because he felt that it would raise the status of pharmacy. Things had been engrafted on pharmacy, company pharmacists, and so on, that ought never to have arisen, and would not have arisen if the pharmacists had been careful. There was talk of legislation, and it would come perhaps, not when pharmacists were better represented, but when the general mass of pharmacy was raised to a higher status.

The PRESIDENT moved a vote of thanks to Professor Marshall for his paper, and said that sometimes a mistake was made as to education. At present we were in a state of flux, both with regard to pharmaceutical and other education. The danger was always in rushing to one extreme or the other, and he was afraid we were now trying to push all our population in England through one hole. The hole might be square or round, but they would find it a mistake to put all the people through one hole if they were meant to occupy different positions in life and to do different work. He conveyed the thanks of the meeting to Professor Marshall.

The next paper was also read by Professor Marshall.

### THE TOXIC PRINCIPLES OF THE CORIARIÆ.

BY C. R. MARSHALL, M.D.,

*Professor of Materia Medica and Therapeutics in the University of  
St. Andrews.*

The Coriariæ is a somewhat ill-defined order, containing one genus and about twelve species, with a wide geographical dis-

tribution. The best known—*Coriaria myrtifolia*, L.—is found abundantly in the countries bordering the Mediterranean, and others occur in the remaining three continents, especially in India (the Himalayas), the East Indies, China, and Japan; in the countries between the United States and Chile; and extensively in New Zealand. The European and New Zealand species have been most largely investigated. Of the others comparatively little is known.

My own interest in this group was awakened by a letter from my friend, Professor Easterfield, of Wellington, asking me to investigate the action of a crystalline substance he and Mr. Aston had isolated from three of the New Zealand species of *Coriaria*. Previously, I only knew—and it seems that there was little else to be known—of the existence of coriamyrtin, a crystalline principle isolated by Riban<sup>(1)</sup> from *C. myrtifolia* nearly forty years ago. This plant (*C. myrtifolia*) is an ornamental shrub largely grown in Southern Europe, and especially in the departments of Aude and Hérault, in France. It was formerly extensively used in tanning; but, I believe, except in Russia it is much less used now.<sup>1</sup> The leaves have also been used to adulterate senna, and in this form have given rise to many fatal cases of poisoning. It is not so used now.

According to Riban the plant was known to Pliny, but its toxic properties are not mentioned until the beginning of the eighteenth century. Then a series of cases of poisoning are described, and since then the number has been largely augmented. In brief, the symptoms, which usually come on in one-half to two hours, are malaise, nausea, and vomiting followed by convulsions, which at first are clonic, then often tonic, and coma or exhaustion. Death is common. Recovery after large amounts rare. The cases have resulted from taking an infusion of adulterated senna leaves, but more frequently have occurred from the eating of the ripe berries, which present a pleasant appearance, and have a sweet and luscious taste. Sheep and cattle have also been poisoned by eating the new succulent twigs.

From this plant Riban isolated a colourless, crystalline principle. This he obtained by adding subacetate of lead to the expressed juice (best of the leaves) until no further precipitation occurred, filtering and precipitating the excess of lead by hydrogen sulphide, then evaporating to a syrup and extracting with ether. On evaporation coriamyrtin crystallized out and was purified by

<sup>1</sup> The plant is said to be used habitually by tanners for gleet.

recrystallizing two or three times from alcohol. This substance proved to be the active principle. It was extremely toxic, and it produced all the general effects of the leaves of the plant. Chemically, it was shown to be a glucoside, and was found to melt at 220°C. (corr.). It dissolved in water to an extent of 1.44 per cent. at 22°C., and was readily soluble in boiling alcohol, in ether, chloroform, and in benzene.

What is most curious, however, is that the commercial coriamyrtin of to-day is not that described by Riban. His description is still given in all the text-books, but the melting point given by Merck<sup>(2)</sup> is 228–229°C.; that of Easterfield and Aston's specimen is 225°C. (uncorr.)<sup>(3)</sup>, and that of my own 224°C. (uncorr.). Moreover that supplied to me is not a glucoside and its solubility in water, far from being 1.44 per cent., is less than 1 in 1,000. Indeed it crystallizes out from this strength. Physiologically, however, it possesses a similar action to Riban's coriamyrtin.

Of New Zealand Coriariæ four species are described, and they are said "to vary to a remarkable extent, and should probably be referred to a single species"<sup>(4)</sup>. The three most important species are *C. ruscifolia*, L., *C. thymifolia*, Humb., and Bonp., and *C. angustissima*, Hook. *C. lurida*, Kirk., has no distinctive features beyond its lurid purple colour. These plants are known locally as "tu-tu" or "toot-plants." *C. ruscifolia*, or "tree-toot," is a shrub or small tree with spreading branches and glossy succulent leaves and shoots. It grows to a variable height, being often 20 to 25 feet. In a single season even, robust shoots develop from the root-stock, which grow to the height of 6 to 10 feet<sup>(5)</sup>. *C. thymifolia*, or "ground-toot," is herbaceous and rarely grows more than 3 feet in height; usually it is little more than 1 foot. *C. angustissima* is also herbaceous. It occurs in broad patches and is comparatively rare. The branches are very slender and terminate in almost capillary-sized endings, and this with the numerous small leaves give it a fern-like appearance.

From each of these plants Professor Easterfield and Mr. Aston have isolated the same crystalline active principle. For this they propose the name "tutin." They obtained it by evaporating the filtered expressed juice of the finely divided shoots of *C. ruscifolia* to a syrup, nearly neutralizing with sodium carbonate, and shaking up with ether. On allowing the ether to evaporate crystals of tutin separated out. The process was slightly modified in the case of the other two species. The crude tutin was purified by crystal-

lizing it from alcohol until the melting-point was constant. This was found to be 208–209°C. (uncorr.). Tutin is slightly soluble in water and in ether, and moderately soluble in alcohol. One hundred Gm. of water at 10°C. dissolved 1.9 Gm. of tutin. It is a glucoside, and its formula is given as  $C_{17}H_{20}O_7$ .

Pharmacologically it possesses a similar action to coriamyrtin, so that the relation of the two as well as the relation to Riban's coriamyrtin is interesting. From molecular-weight determinations of the coriamyrtin now obtainable, Easterfield and Aston conclude that it has only half the formula given to it by Riban. That it is, in fact,  $C_{15}H_{18}O_5$ . The further relationship of these bodies has not been determined.

The main interest, commercially, about "tu-tu" is the loss of stock which it causes to settlers.<sup>1</sup> In the springtime the plant sends up succulent shoots, resembling in some respects asparagus, and when other fodder is scanty these are frequently eaten by sheep and cattle just turned out into the open. As a consequence they often become "tooted." In this condition they are stupefied, or, especially if roused, they run wildly about, careless of obstacles, until exhaustion sets in. Then not infrequently death follows. Lindsay<sup>(5)</sup>, who visited the colony in 1863, says:—"One settler friend told me of his having lost by tooting 250 sheep; another, 80 to 100 sheep of a flock of 400; a third, seven of sixteen bullocks; a fourth, six of twenty-four cattle; a fifth, twenty-four cattle; a sixth, six of eight cattle; each of those instances in a single night. Another flock-master lost 400 out of a flock of 2,000, twenty-five being frequently dead of a night. In other words, he seemed a fortunate farmer or run-holder who had not lost more than 25 per cent., or a quarter of his stock, from toot-poisoning; while in some instances the losses were as high as 75 per cent., or three-quarters." Now, however, such losses seem to be rare.

But poisoning by these plants is not confined to stock. Many men and children have lost their lives through eating the berries, which are moist and succulent, and resemble a blackberry. The symptoms are similar to those produced by *C. myrtifolia*. The chief are vomiting, convulsions, and stupor. Loss of memory, strange to say, has been noticed among those who have recovered. The poison of the fruit resides within the seeds; the juice appears to be harmless. From it the Maoris used to make a beverage, and

<sup>1</sup> The juice of the fleshy petals of the *C. thymifolia* is used as ink in South America under the name "chauchi." And in China a black stain used by shoemakers is obtained from *C. ruscifolia*.

they frequently quenched their thirst by sucking the berries through a cloth. The fruits of the *C. thymifolia*, however, when eaten immoderately by the inhabitants of Quito, are said, even when disburshed of their seeds, to produce a gay delirium, and to prove fatal after a certain time<sup>(6)</sup>.

*C. nepalensis* is said to be non-toxic. Its fruit, apart from the seeds, is eaten by the tribes inhabiting the Himalayas, and also, I believe, by the natives of the East Indies. There is, however, a belief in one district of the Punjab that the plant is highly poisonous<sup>(7)</sup>. As yet the matter has not been settled. But in a letter to me some time ago, which unfortunately has been destroyed or misplaced, Professor Easterfield said he had been unable to extract tutin from a species of *Coraria*—*C. nepalensis*, I think—sent to him from Borneo.

*C. atropurpureus*, D.C., found in Mexico, is said to be powerfully poisonous. The toxic properties of the other species of *Coraria* are as yet unknown.

This order, therefore, besides being botanically, is also pharmacologically interesting. It is an example of an order which, although widely and somewhat sparsely distributed, contains closely allied toxic ingredients in its various members. Why *C. nepalensis*, if such, should be an exception, we do not know. Such examples are not rare, but nearly all still require an explanation. Is it that their metabolism is slightly affected by their environment, thus leading to the formation of slightly different, but yet non-toxic products? or is it so powerfully affected that the products are entirely dissimilar? And why is their metabolism so changed? These questions, on the borderland of chemistry and botany, are questions which pharmacists might advantageously take up. It is their special department of advanced research. We want doing for poisonous what the agricultural chemist is attempting to do for nutritious plants. The storehouse, if hard to enter, is yet rich in treasure, and few need come away empty-handed.

#### REFERENCES.

- (1) Riban, *Recherches Expérimentales sur le principe Toxique du Redoul*, Paris, 1863, p. 78.
- (2) Merck's *Annual Report* for 1898, published March, 1899, p. 52.
- (3) Easterfield and Aston. *Trans. Chem. Soc.* 1901; also *Reports of New Zealand Department of Agriculture: Chemical Division*, 1900.
- (4) Kirk., *The Student's Flora of New Zealand*, 1899, p. 97.
- (5) Lindsay, *Brit. and For. Med. Chir. Review*, July, 1865, p. 153. A valuable contribution to the subject.
- (6) Dujardin-Beaumetz et Egasse, *Les Plantes Médicinales*, 1889, p. 586.
- (7) Watt, *The Economic Products of India*, vol. ii., p. 570.

Mr. A. W. GERRARD said he would like to draw attention to a statement in the paper, and would ask Professor Marshall how he classified this substance. Was it an alkaloid, a glucoside, or a neutral principle? He noticed that it was prepared by neutralizing with sodium carbonate and washing out with ether. If it was a glucoside, that seemed to him rather a curious process, and much more on the lines of the process adopted for the separation of an alkaloid.

Professor MARSHALL, in reply, said the juice of the plant was very acid, and sodium carbonate was simply added to diminish this acidity. He had no doubt at all that the substance was a glucoside.

The author was cordially thanked for the above paper.

The following paper was then read :—

#### SOME EXAMPLES OF GALENICAL PREPARATIONS MADE ON THE RETAIL SCALE.

BY JOHN H. THOMSON.

The opinion is widely entertained that galenical preparations can be manufactured with exactness and economy only on the large scale, and partly on account of this supposition, but also owing to several changes in retail pharmacy on the commercial side during recent years, the retail chemist has largely abandoned one of his most important functions by purchasing the greater part of his galenicals ready made. There may be conditions in which this practice is defensible—stress of competition and difficulties in respect of shop assistance perhaps justifying a negative reply to the question, Does it pay to make galenicals? But the economy gained is of that order which, while it may be expedient for the individual, is destructive to the class. A bad feature of the matter is that the tendency is steadily becoming common to retail pharmacy as a whole, although there are numerous retail businesses to which it is not properly applicable even on the principle of economy. I refer to those, such as my own, where the customers are not of the class amenable to present-day pushing methods, and the volume of business is in a great measure concentrated into a few hours of the day, so that much of the time is unoccupied. In such businesses it is in every sense economical to make one's own galenicals, apart from the following general considerations which every one engaged in retail pharmacy as a prin-

cial should recognize to be advantages belonging to the practice.

1. It turns to practical account the technical skill and knowledge acquired in student days, and employs this knowledge and skill to the best advantage.

2. It is a valuable means, and the only rational method of training apprentices to perform those pharmaceutical operations with which they must prove their familiarity when they come before the board of examiners.

3. It gives the individual pharmacist the satisfaction of supplying preparations which to his personal knowledge are free from adulteration and substitution.

I do not in anything I have said, or may say, desire to make comparison with the work of large manufacturers, who admittedly play an important rôle in the economy of the trade, and who by specialized skill and fine appliances have done much to advance modern pharmacy. But I contend that there are many things which the retail pharmacist ought to make for himself. Each one should have a longer or shorter list of articles whose preparation he ought to retain in his own hands; and thus contribute in some measure towards rescuing galenic pharmacy, so far as the retail chemist is concerned, from becoming a lost art. As a matter of interest and of business, it is well to keep a daily record of operations performed, and, in the hope that they may be helpful to others, I proceed to give some notes based upon my own records.

*Distilled Water.*—The freshness and purity of this are ensured by preparing it on the premises in an apparatus kept exclusively for the purpose. Two gallons are distilled, the time occupied being three hours. The burner used consumes 25 cubic feet of gas per hour at a cost of 3d. for the three hours.

*Aromatic Waters* are admittedly best prepared by distillation. Peppermint, cinnamon, and dill waters are thus made. The still used is a modification of Remington's, made locally. The details of its construction are given in Remington's *Practice of Pharmacy*, p. 166. The modifications were designed in consultation with my friend, Mr. Peter MacEwan, and their principal feature is the altered position of the condenser, which, moreover, is secured to the still-head by a vapour-tight screw coupling, and requires no support, as its weight is more than counterbalanced by that of the boiler. Economy of space is secured by this modification. In making cinnamon or dill water, the drug is placed in a copper wire cage, which rests upon the flat bottom of the boiler and protects the drug



from partial burning. The waters are made in one-gallon quantities, a smaller burner, consuming  $12\frac{1}{2}$  cubic feet of gas per hour, is used, and the time occupied is about five hours. In each case the distillate as collected in the stock-bottle is found covered with a layer of oil. The waters are stored away in this condition, and only filtered as required for filling up the shop-rounds.

*Extracts* form a class not well adapted for working on the small scale, and only a few experimental batches have as yet been attempted.

*Liquid Extract of Cascara Sagrada*.—From 20 oz. of bark treated according to the official directions (evaporation of the percolate being conducted in the pan shown, heated by the smaller burner) 1 lb.  $5\frac{1}{2}$  oz. of liquid extract was obtained. Sp. gr. at  $15.5^{\circ}\text{C}$ ., 1.080. Extractive from 100 c.c.; dried at  $100^{\circ}\text{C}$ ., brittle and pulverizable, 28 Gm.

A trade sample, said to be made by an improved process, was examined for comparison. Its sp. gr. was 1.088; and 100 c.c. yielded a sticky residue weighing 31.7 Gm. after being dried for two hours at  $100^{\circ}\text{C}$ . The residue apparently contained glycerin.

*Liquid Extract of Liquorice*.—From 20 oz. of root, the volume of pressed and strained liquor obtained, measured  $63\frac{1}{2}$  fl. oz. When this was evaporated to the required specific gravity, and the alcohol added, the finished product weighed 11 oz.

*Liquid Extract of Ipecacuanha*.—Sixteen ounces of root in No. 20 powder was treated as officially directed, and  $13\frac{1}{2}$  fl. oz. of strong percolate was obtained and set aside; percolation was then continued almost to exhaustion. The marc was then mixed with calcium hydroxide, and percolation continued till exhaustion seemed complete. The alcohol was distilled off from this weaker percolate, and the residual extract dissolved in the reserved percolate, the combined volume being about 16 fl. oz. A portion was assayed by Alcock's method, which, begun one morning, was with interruptions finished the following morning. Five c.c. of the liquid gave a brown alkaloidal residue, weighing when constant 0.095 Gm. (= 1.9 per cent.). By the B.P. method, making use as far as practicable of the published experience of others, especially of Bird (*Pharm. Journ.* [4], 10: pp. 176, *et seq.*) 10 c.c. of the liquid yielded a pale brown residue, which, after drying for two hours till constant, weighed 0.184 Gm. (= 1.84 per cent.). The volume of liquid extract after assay was about 15 fl. oz., weighing  $13\frac{1}{2}$  oz.

*Glycerin of Boric Acid* is made by the official method, but is generally ordered to be diluted with 2 parts by weight of glycerin.

*Glycerin of Tannic Acid*.—Tannin, 4 oz., and glycerin, 22 oz., are weighed in a dish and stirred, solution being promoted by gently warming over a water-bath. The product is 20 fl. oz.

*Glycerin of Borax*.—Borax, 1 lb., and glycerin, 7½ lb., are weighed in a dish of suitable capacity, stirred, and warmed on a water-bath till solution is effected. As made with powdered borax, the solution is not bright, and requires filtration to make it so. This is quickly done with the hot-water funnel shown.

*Mercury with Chalk*.—Working with the official quantities, the mercury is extinguished by diligent rubbing, repeated at intervals during the day. Three ounces (a quantity sufficient for present-day requirements) are thus made.

*Concentrated Compound Infusion of Gentian*.—Hitherto this has been made with good results by maceration and expression. The percolation process described by Farr and Wright (*Year Book*, 1901, p. 432) has been tried, and, although percolation proceeds rather slowly, the product is satisfactory. The specific gravity of the sample made by this formula is 1.003, and 100 c.c. yields 7 Gm. of extractive dried at 100°.

*Concentrated Infusion of Senega*.—The official concentrated liquor is first prepared, and then diluted, 4 parts to 5, with alcoholic menstruum used in the preparation of the liquor. So made the concentrated infusion has sp. gr. 1.013, and 100 c.c. yields 10.4 Gm. of extractive, dried at 100° C. A trade sample examined showed sp. gr. 1.014, and 100 c.c. yielded 10 Gm. extractive, dried at 100° C.

*Liquores*.—I pass over the linimenta and proceed to the more interesting group of liquores.

*Solution of Acetate of Ammonium*.—Owing to the variability in neutralizing power of the acetic acid, and to a greater extent, of the carbonate of ammonium, which, moreover, is always much below the standard of alkalinity fixed by the Pharmacopœia, I have adopted the practice recommended by Hill (*Pharm. Journ.* [4], 8, p. 59) of first ascertaining the alkalinity of the ammonium carbonate, and the acidity of the acetic acid by the method he describes, then taking the proper proportions to form a faintly acid solution. The process is expeditious, and one can make by it a solution of uniform strength. The half-litre flask is most convenient for preparing with exactitude the various dilute acids, as well as the percentage solutions of arsenic, morphine and strychnine.

*Arsenical Solution.*—Arsenious anhydride, 5 Gm., carefully weighed and checked, is dropped into a funnel with a long stem placed in the neck of the flask. The potassium carbonate is added, and both are washed down into the flask with about 250 c.c. of distilled water. The clear solution obtained by heating is allowed to cool, the tincture added, and the volume adjusted at 15.5°C. to 500 c.c. The volumetric test is then applied. It presents no difficulty, and forms an interesting object-lesson for the student apprentice. The product weighs about 18 oz.

*Solution of Bismuth and Ammonium Citrate.*—The official process as modified by Cowley and Catford (*Pharm. Journ.* [4], 9, p. 604) is workable, and yields a satisfactory solution with a minimum of loss. One litre (about 2½ lb.) of solution so prepared shows sp. gr. 1.074, and tested gravimetrically contains the equivalent of 5.4 Gms. bismuth oxide in 100 c.c.

*Solution of Morphine Hydrochloride and Solution of Strychnine Hydrochloride.*—Quantities made in the half-litre flask weigh each 17¼ oz.

*Concentrated Solution of Quassia* is made for the production of concentrated infusion (1 to 7). Its sp. gr. is 0.980, and the extractive yield dried at 100°C. is 0.3 Gm. from 100 c.c.

*Concentrated Solution of Senega.*—Forty fl. oz. weigh nearly 2¾ lb. Sp. gr. 1.019; extractive yield from 100 c.c. 12.2 Gm., dried at 100°C. The menstruum retained by the marc is pressed off, filtered, its acidity partly neutralized, and then used for diluting the solution to the strength of the concentrated infusion (1 to 7).

*Compound Mixture of Senna.*—The official black draught is highly popular as a safe, speedy, and pleasant corrective. It is made in four-gallon quantities. Four gallons of senna infusion are put on; 3 gallons are strained off, and half a gallon of this is reserved. The magnesium sulphate is dissolved in the other 2½ gallons, and the rest of the ingredients are added to the cold solution. The volume is finally adjusted with the reserved portion of infusion. The sp. gr. of the mixture is 1.120, and the extractive from 100 c.c., dried at 100°C., weighs 21.3 Gm. From 100 c.c. distilled by the heat of a water-bath, 15 c.c. of ammoniacal spirit was obtained. A trade sample examined had sp. gr. 1.150; 100 c.c. yielded 28.5 Gm. extractive; and 100 c.c. distilled gave 10 c.c. spirituous distillate, destitute of ammonia. The distillation results are merely approximate.

*Compound Powder of Liquorice.*—The separate fine powders

are placed together in a mixing and sifting machine, and to ensure thorough blending the operation is thrice repeated upon the same batch, making 24 lb. at one time.

*Aromatic Spirit of Ammonia.*—In making this the official imperial quantities are taken. The mixture of essential oils, water and alcohol is slowly distilled, all the joints of the still having been carefully secured, and the condenser being kept well chilled. Resublimed ammonium carbonate and ordinary 0.880 solution of ammonia are used. The product measures about  $1\frac{1}{2}$  fl. oz. less than a gallon. The official tests are applied. I have not yet succeeded in keeping the specific gravity lower than 0.897. The total alkalinity is at first below the standard owing to the weakness of the carbonate. This, however, is remedied by adding a little more strong solution of ammonia, as suggested by White (*Pharm. Journ.* [4], 10, p. 144). The alkalinity is then found to be equivalent to 25.8 c.c. normal sulphuric acid. The due proportion of carbonate is also present, as shown by the official test. A trade sample, from a newly-opened Winchester, had specific gravity 0.904, and alkalinity equivalent to 26.3 c.c. normal sulphuric acid.

*Syrup of Iodide of Iron.*—One litre (about 3 lb.) is made. The specific gravity is taken and found to be 1.395, the volume having been adjusted with diluted syrup instead of distilled water. Ten c.c. assayed according to the official test yields a clear filtrate, 25 c.c. of which, neutralized, requires for complete precipitation of the iodine 16.6 c.c. decinormal silver nitrate. The syrup, therefore, allowing for experimental error, may be regarded as of maximum strength. The test when applied to a sample containing a trace of hypophosphorous acid added as a preservative proved unworkable.

*Syrup of Phosphate of Iron with Quinine and Strychnine.*—On account of its imperfect keeping properties this should be made in small quantities and often.

*Syrup of Lemon.*—Twenty-eight pounds of lemons are purchased, and yield 4 lb. grated peel and 6 pints clear juice. Added to 96 fl. oz. of 90 per cent. alcohol, the peel is converted into  $6\frac{1}{2}$  pints of strong tincture. Part of the tincture is used in the preparation of the syrup, the remainder in making the concentrated infusion of gentian. In the juice, clarified by filtration through kieselguhr, is dissolved 12 lb. of sugar. The solution is strained, and, when cold, is mixed with 10 fl. oz. of the tincture. Product, 20 lb. of syrup of lemon of excellent quality.

*Syrup of Tolu.*—The official process might well be replaced by the formula devised by Farr and Wright (*Year-Book*, 1899, p. 366). Their liquor is easily made, and being a 1 to 7 preparation, is convenient, while the syrup produced by its dilution is very satisfactory.

*Tinctures.*—Notwithstanding the advantage possessed by the large manufacturer over the small operator, in being able with powerful machinery to extract the last drop of spirit from his residues, tincture-making may yet be profitably engaged in by the retailer.

*Tincture of Opium.*—Operating on 300 Gm. of opium, 1,945 c.c. of strong tincture was obtained, 80 c.c. of which was taken for assay. The proportion of anhydrous morphine in 100 c.c. of the strong tincture having been found to be 1·8 Gm., the remaining 1,865 c.c. was diluted to 4,476 c.c., so as to contain 0·75 per cent. w/v of morphine. The weight of tincture of opium thus produced was about 9½ lb. Sp. gr. 0·950; yield of extractive per 100 c.c., 3·35 Gm.

The following among other tinctures are also regularly made, the drugs used in their production being purchased entire, and reduced to the different degrees of fineness by means of an Enterprise drug-mill and a set of sieves varying in mesh from Nos. 5 to 60. For those prepared by the percolation process, the conical tin percolator with brass tap shown is used.

*Compound Tincture of Benzoin.*—By the modified process of Merson (*Year-Book*, 1901, p. 179), 1 pint, weighing 18 oz., was produced. Sp. gr., 0·900. Extractive yield, 20 per cent.

*Tincture of Orange.*—The shredded peel is bought in the season from a local confectioner and converted into tincture. The sp. gr. is 0·882.

*Compound Tincture of Camphor.*—Four pints (about 4½ lb.) are made. Sp. gr., 0·919.

*Compound Tincture of Cardamoms.*—Quantities for 2 gallons are taken. The yield is 15 pints, 8½ fl. oz., weighing 18¼ lb. Sp. gr., 0·950. Extractive yield, 8·2 per cent.

*Tincture of Catechu.*—Twice the B.P. quantities (imperial) yield 41 fl. oz., weighing 2½ lb. Sp. gr., 0·978. Extractive yield, 14·4 per cent.

*Tincture of Digitalis.*—Two pints (about 2½ lb.) are made. Sp. gr., 0·985. Extractive yield, 4·15 per cent.

*Tincture of Hyoscyamus.*—Two pints (38 oz.) are made. Sp. gr., 0·957. Extractive yield, 2·97 per cent.

*Tincture of Myrrh.*—Four pints (about 4½ lb.) are made with gum myrrh. parv. Sp. gr., 0·855. Extractive yield, 5·65 per cent.

*Compound Tincture of Rhubarb.*—Two pints (about 2½ lb.) are made. Sp. gr., 0·975. Extractive yield, 17·7 per cent.

*Specific Gravities.*—Specific gravities are taken in a 10 c.c. stoppered flask at 15·5°C., weighed on a fine dispensing balance. The contents of the flask are then rinsed into a tared tin dish, evaporated on a water-bath, and finally dried at 100°C. for one hour in a hot air oven extemporized from a jujube tin, the bottom and top of which are freely perforated. The oven is supported over a Doulton gas stove, and the temperature regulated by means of a thermometer. The weight of residue multiplied by ten indicates the amount of extractive contained in 100 c.c. of the tincture under examination.

*Mercuric Nitrate Ointment.*—This is made by Squire's process, as being more manageable than that of the B.P. A jar holding ten times the quantity does not prevent frothing over, and some consequent loss. Working with twice the official quantities (imperial), the yield was 24½ oz.

*Zinc Oleate Ointment.*—The washed cake of oleate is partly dried by expression, reduced to a coarse powder, spread on blotting paper, and further dried by exposure to air in a well-ventilated room free from dust. For the cost of 4 oz. zinc sulphate and 8 oz. soap, 6½ oz. of creamy white oleate in No. 40 powder is obtained, which dissolves readily in an equal weight of melted soft paraffin, and forms a satisfactory ointment.

*Ipecacuanha Wine.*—Four pints are prepared from liquid extract of own make and detannated sherry. Weight after filtration and assay, about 4¾ lb.

I trust these examples will suffice to show the practicability of producing on the small scale many galenical preparations satisfactory in point of character, and economical in point of cost. I gladly express my indebtedness to friends who have revised my notes and aided me with some valuable hints and suggestions.

Mr. TYRER said that fortunately he was not a retail pharmacist. To make such preparations as Mr. Thomson had described one must have a large amount of leisure, and that meant little business, or a large business with a number of assistants whom it was his duty to teach. The paper was a brilliant example of how to make the best of—should he say?—a bad thing. He was taking things as they were, and the question was, "Were they deceiving

themselves, or not?" He did not think a lean business with small practice lent itself to a large number of men following the example. But the author had left out of account many things which should be considered before it could be shown what was the cost of the work that had been done. He thought they were very much in want of having reasonable confidence in one another in regard to the whole matter of cost of production.

Mr. BIRD expressed admiration of the paper, and said that in the past he thought the ideal pharmacist had been one who had prepared his own preparations, so that he might personally guarantee their purity. That at once presupposed that the retail pharmacist was an honest man, while the wholesale pharmacist was perhaps the reverse. He did not think Mr. Thomson had adduced those reasons or put them in a prominent position, but had rather laid stress on the contention that where a pharmacist had time he might make these preparations, and that that was useful training for his apprentices. With that he agreed. Mr. Thomson had stated that he had not obtained from 1 lb. of ipecacuanha the pharmacopœial quantity of fluid extract containing the requisite percentage of alkaloids, which confirmed what he (Mr. Bird) had on a former occasion pointed out. Mr. Thomson had omitted the question of cost of labour and apparatus in addition to the cost of ingredients, a very important item. He thought that Mr. Thomson had brought before them a most interesting paper.

Mr. MARTIN said he thought the pharmacist could utilize his knowledge in preparing such of these pharmaceutical preparations as he could find time for. Mr. Thomson had shown much ability. There was one point in regard to the paper to which he desired to draw attention. It had always been the rule in this Conference to adhere strictly to the scientific side of pharmacy. This Conference had nothing to do with the question of prices. The prices as stated in Mr. Thomson's list were most misleading, because there were figures that were left out of account, and he could not see that they were of the smallest scientific value. They must remember that that was the basis of this Conference at the outset, and if they had outside that room and that discussion a commercial value, so much the better; but the Conference had nothing whatever to do with publishing the prices. If the prices were put in the *Year-Book* it would cause a considerable amount of friction, and he trusted Mr. Thomson would consider that point.

Mr. MABEN said it was very gratifying to find members reading papers like this at this Conference. So long as they had men like

Mr. Thomson doing so pharmacy was not going to die. One point struck him, though it was not of much importance. He used to make his own distilled water, but he had to pay 10s. 6d. to the Inland Revenue for a still licence, and that certainly did not work profitably. He had made all these preparations for twenty years. His business was not a very big one, but still it took up a lot of his time, and he dissented entirely from Mr. Tyrer's remarks. As to what Mr Martin had said about publishing the figures, he thought that they would cut out the best of the paper in not publishing the figures. It was well enough known that no one would expect to get these preparations from wholesale houses at the prices mentioned in the paper, which were not selling prices at all.

Mr. UMNEY said that they could not discuss there the relations between the wholesaler and the retailer, but he desired to compliment Mr. Thomson for showing what could be done in this way in retail pharmacy. During his own apprenticeship with a master who had now gone over to the majority, he had been trained right from the bottom. The very first thing he had to do was to grind quillaia in a handmill, and he considered that that kind of training in the making of galenicals was better than any academic training they could get. The men who were trained from the bottom were the best.

Mr. J. R. HILL contended that Mr. Tyrer's references to leisure in business was open to misconception. Many chemists who did that sort of work had a fair business, and if pharmacy was not to become extinct that kind of work must be done. Pure laziness was at the bottom of it not being more general. Nothing was to be gained by the suppression of the prices, and it was impossible to deal with the subject without treating of the aspect.

Mr. UMNEY referred to Mr. Hill's remarks stating that the wholesaler frequently gave a written warranty or guarantee, and he maintained that his honesty was equal to that of the retailer.

Mr. JAMES MACKENZIE submitted that the pharmacist's duty was to make as many preparations as possible.

Mr. PAYNE thought it was not in the interests of the Conference that the prices should be published.

Mr. W. L. HOWIE felt sure that Mr. Thomson's position was not that his preparations were cheaper than those of the wholesaler, but that it was in the interests of pharmacy that retailers should give their apprentices every opportunity of acquainting themselves with pharmaceutical processes. Mr. Howie did not think the publication of the prices would do any harm to those specially



interested in the matter, but Mr. Martin's point might be considered in relation to its bearing upon the scientific purposes of the Conference.

The PRESIDENT, in summing up the matter, said he was afraid that Professor Marshall's discussion of the morning before had left a trail of the serpent. The reference to prices reminded him of an incident that happened when he was staying in a nobleman's house. A discussion on agricultural depression was taking place, when a lady said she could not understand what the farmers had to grumble about, as she was getting a good return from the home farm. "Yes, my dear," said her husband, "you do not pay any rent—and I pay the wages." The principle of that might apply to Mr. Thomson's prices. The President was of opinion that a rough apprenticeship, in the course of which these things were made, was a very good training for pharmacists, and in his pessimistic moments he felt inclined to think that an academic training could not do what a practical and business training did. The object of such work as Mr. Thomson had treated of was to save pharmacists from degenerating into mere hucksters.

Mr. THOMSON replying, said it was impossible to touch upon all the points mentioned by the various speakers, but he thanked all for the sympathetic remarks made. When he compiled his paper it was certainly not his intention to show that pharmacists pay more for preparations obtained from wholesalers than they could be made for in the pharmacy. He had fortunately never been disappointed either in the price or quality of the galenicals he had obtained from his wholesale friends. His object was simply to show that the work could be done without loss, as the argument had often been put forth that such preparations could not be made remuneratively. With regard to the publication of the prices he had no particular desire that they should appear.<sup>1</sup>

Mr. Thomson was heartily thanked for his paper.

Mr. MABEN then read an abstract of the following paper:—

## THE OFFICIAL RECOGNITION OF ANTI-DIPHTHERIAL SERUM.

BY THOMAS MABEN, F.C.S.

Before a new remedy can be introduced into the national Pharmacopœia two conditions require to be met. Stating the

<sup>1</sup> The prices above referred to have been omitted.

position in the abstract, we ask regarding any new remedy, first, has the therapeutic value of the remedy been placed on a perfectly sure foundation? In other words, has it passed the experimental stage? And, secondly, is its importance such that it demands recognition by insertion in the Pharmacopœia? If the medical profession is united regarding the therapeutic properties and the administration of the remedy, or even if medical men are fairly unanimous on these points, absolute agreement being difficult to attain, and if the importance of the remedy is sufficient to warrant its recognition, then, as a matter of course, the drug ought to be introduced into the Pharmacopœia. It might happen, as in the past it has happened, that the recognition of the remedy would be desirable, but for certain reasons, such, for example, that the remedy is the subject of a patent, or is a trade monopoly, the recognition may be withheld; but even these reasons are not always regarded as sufficient to exclude a known remedy of proved efficacy. We may, therefore, affirm that if the experimental results warrant the recognition of a remedy, and if there be no theoretical or practical objections to its being recognized, then recognition ought naturally to follow.

There will probably be few who will object to this affirmation in the abstract, but when we apply the principle in a concrete case such as that under consideration, viz. anti-diphtherial serum, there may be brought forward other objections based on conditions that do not apply when we are dealing with ordinary natural or synthetic products. It may be desirable first of all to clear the ground by answering the two questions already asked, and if these be answered in the affirmative we shall then be able to consider other points that arise.

First, has anti-diphtherial serum passed the experimental stage, and has its therapeutic value been recognized by the medical profession? As to this question, there can be but one answer in the minds of those who keep an open ear to the progress of medical science. Undoubtedly the serum treatment, in so far as diphtheria is concerned, has long passed the experimental stage, and its value is now universally recognized. The latest statistics available on a fairly large scale are those of the hospitals of the Metropolitan Asylums Board, London. For the five years, 1890-4, preceding the anti-toxin period the death-rate from diphtheria in these hospitals was 29·6 per cent.; in the five years following the introduction of anti-toxin the death-rate was 16·9 per cent. The actual saving of life during this period was 3,703, almost exactly 740 per

annum. In Glasgow, in one hospital alone, the death-rate has been reduced to less than half, with a saving of life of forty per annum during the last seven years. Taking the British islands all over, the introduction of serum means that probably 10,000 lives are annually being saved. The capital value of a life has been computed at £15, and, if this figure be accepted, it is clear that the introduction of this remedy adds every year to the capital value of these islands no less than £150,000. Some may think this a low platform to take in estimating the value of a remedy, but it is a solid platform and one that the business man can always appreciate. The same reduction in the percentage of fatal cases has been obtained wherever, throughout the world, the anti-toxin treatment has been resorted to, and so emphatic has been the verdict of medical science in favour of the treatment, that if a physician were to-day found neglecting the primary duty of injecting serum at the earliest possible moment after he had diagnosed diphtheria, he would almost certainly be considered guilty of malpractice. It may therefore be taken for proved that the serum treatment has now passed the experimental stage, and that so far as diphtheria is concerned serum therapy has been placed in an unassailable position.

For answer to our second question, the statistics already given may be cited. A remedy that can show results so marvellous as these statistics indicate is surely sufficiently important to demand official recognition. There are few of us who are not old enough to remember the ravages caused by the disease not so many years ago; there are few who do not recall whole families decimated by it, and the helplessness of medical men in its presence. This feeling of impotence has now given way to one of absolute confidence, so that when a medical man gets a case of diphtheria early he knows he can meet the enemy straight in the face and overcome him. Unfortunately, in our public hospitals they do not, as a rule, get the cases early. These hospitals are mainly filled with patients drawn from the poorer classes of society, and it too often happens that a child is ill for two or three days before the doctor is sent for. The result of this is seen in the death-rate of every hospital. For example, in one hospital, in Glasgow, in the latest year for which a report has been issued, we find that eight cases were admitted on the first day of the disease, and all recovered; twenty-two cases were admitted on the second day of the disease, and the mortality was 9 per cent.; fifty-eight cases were admitted on the third or fourth day of the disease, and the mortality among these

was 15·5 per cent. ; while ninety-six, or more than half the total, were admitted on the fifth day and upward, the mortality being 19·8 per cent. These figures seem to indicate that when diphtheria is treated on the first or second day with serum, death need rarely occur. As the superintendent of the hospital in question states in his report, we have this paradox : "That it is better for a child to be immediately ill or take what appears to be a severe attack of diphtheria and thus come at once under treatment, than to take an apparently mild attack which, in the parent's mind, is not of sufficient gravity to demand the attention of a medical attendant until the illness has progressed for several days." In view, therefore, of all these circumstances, it will surely be universally admitted that the remedy is of the very first importance, and just because of its importance it is all the more necessary that every precaution should be taken to ensure that the remedy will be all the time, and every time, absolutely above suspicion.

The first objection that naturally suggests itself, assuming that it were desirable to introduce anti-diphtherial serum into the Pharmacopœia, is this. Is it practicable to draw up a monograph giving tests and such other particulars as will meet the object in view? In the case of ordinary galenicals it is quite a simple matter to fix standards, and it is an equally simple matter for a pharmacist to assay his galenicals, whether these are prepared by himself or supplied by a wholesale manufacturer, but can this be done in the case of serum? The preparation of serum must always necessarily be in few hands. It is quite impossible for a pharmacist, and, in the ordinary course, equally impossible for a wholesale druggist to prepare serum, and still more difficult for them to test it when it is prepared. It appears to follow, therefore, that if anti-diphtherial serum is to be introduced into the British Pharmacopœia some machinery must be established, either by the Government or by the General Medical Council—that is to say, some special body requires to be set up for the purpose, whereby the serum can be tested and certified before it is put on the market. This official authority would require to give such a certificate as would guarantee to the retailer that he was handling a standard article, and that he was absolutely safe so long as the serum was not beyond the age stated on the label. This is a "large order," but why should it not be taken in hand? Ought the health and life of the community not to be the very first consideration? The recent startling disclosures in the *Lancet* with regard to another subject constitute a painful commentary on our boasted advance-

ment in applied medicine, or shall we say in civilization? If the sale of serum continues on its present footing, can any one of us be bold enough to say that it never can happen that the *Lancet* may one day again be compelled to publish another report on serum similar to that published in 1895, which went to show that the anti-diphtherial serum on the market at that time was, to say the least, extremely unsatisfactory?

This leads to the next point that may be raised by some objectors—is it necessary? So far as Great Britain is concerned, I am glad to think that at the present moment there is no reason to believe that any actual injury is being done by the serum on the market, and no serious fatalities seem to have resulted from the use of this serum. But as the demand increases, can we hope that this immunity will continue? Diphtheria will always be with us, so far as we can judge, and the tendency at the present day is to give much larger doses. With a rapidly growing demand there is just the possibility that we may have increased sources of supply, and those sources may not always be above suspicion. On the continent and in America there have been, at least on three separate occasions, quite a number of deaths from tetanus from the use of impure serum. What guarantee is there that a similar calamity might not occur here? And if such a calamity did occur, an irreparable injury would be done to the cause of medicine for many years to come.

Assuming that the serum were to be introduced into the Pharmacopœia, the following questions naturally arise:—How should the serum be described? Should tests be applied for its identification to determine whether it is sterile and to determine its potency or anti-toxin strength? Should an antiseptic be prescribed for its preservation, and, if so, in what percentage? Should a qualitative and quantitative test be given for this antiseptic? And what about the storage and sale of the serum? In order to guide us a little in considering these points, it may be desirable to quote the statement in the German Pharmacopœia of 1900 with reference to this subject. Anti-diphtherial serum is now official in Germany, and the following is a translation of the text of the Pharmacopœia, relating to the product:—

#### SERUM ANTIDIPHTHERITICUM.

“The blood serum of horses that have been immunized against the toxin of diphtheria. It is placed on the market by authorized factories after being tested by the Royal Prussian Institute for

experimental therapy at Frankfurt-am-Main, as to strength in units of immunization, as to its freedom from bacteria and as to its contents in preserving material (phenol or trikresol), and after having been authorized for sale, it is placed on the market in fluid and solid form. Fluid and solid anti-diphtheritic serums are sold only in vials officially sealed, and upon the labels of which are entered the place of manufacture, the content of anti-toxin per c.c., as well as the whole content of the vial, the test number and the date of official test. These vials are contained in light proof packages, upon the outside of which the same data are recorded. The seals are marked on one side with an eagle or a lion; on the other with the number of immunization units contained in the entire amount.

"Liquid diphtheria anti-toxin is a yellowish, transparent fluid, having the odour of the preserving agent, and with, at most, only a slight sediment. It comes in vials of various sizes and colour, the contents of which represent from 100 to 3,000 immunization units. The sizes most used are No. 0, 200 immunization units; No. 1, 500-600 immunization units; No. 2, 1,000 immunization units; No. 3, 1,500 immunization units. Diphtheria anti-toxin, which contains more than 300 immunization units in each c.c., is classed as a high-potency serum.

"The solid diphtheria anti-toxin is a dried, high potency serum, containing at least 500 units per gramme, and free from antiseptic or other foreign additions. It consists of a yellowish-white powder or yellow transparent lamella, which, by the addition of ten parts of water, dissolves to a liquid corresponding in colour and general appearance to the liquid diphtheria anti-toxin. It is to be sold in white glass-stoppered vials of a capacity of from 2 to 6 c.c. each, containing single doses of from 250 to 1,000 units. The solution is to be made freshly when needed, in the original vials, by the addition of 1 c.c. of sterilized water for each 250 units. This solution should be clear except for small floccules of albumen, and is to be delivered in original bottles. Anti-toxin with marked permanent cloudiness or with copious sediment, as well as anti-toxin bearing a test number which has been ordered to be withdrawn, is not allowed to be sold in the pharmacies. To be preserved in a cool place and protected from light."

It will be observed that in this monograph no tests whatever, for general use, are specified. The tests are made officially, and every vial is certified as to immunization strength or potency, freedom from bacteria, amount of antiseptic, content of vial, and the date of the test. In this way the retailer is completely protected,

save in the case where he has stocked too heavily and may have serum on hand out of date, in which event he stands to lose on the transaction.

Taking the points stated above in their order, some difference of opinion may arise regarding the description of anti-diphtherial serum. The German Pharmacopœia recognizes the solid diphtheria anti-toxin, but this has not been received in this country with any degree of favour by the profession. Any description of serum adopted by the Pharmacopœia should be sufficiently elastic to provide for a serum of any potency, from 200 to 1,250 or upwards anti-toxin units per c.c., always provided the serum is sent out in the actual condition in which it is obtained from the horse.

A difficulty arises, as we have already indicated, when we begin to consider whether tests ought to be introduced for identification, potency, freedom from bacteria, and the quality or quantity of antiseptic. The only possible test for identification is a biological one—viz. the ability of the serum to protect animals—guinea-pigs being invariably employed—from diphtheria infection and intoxication, and this same test, which is always carried out quantitatively, gives the potency. This test can only be made by an expert, and, moreover, when a vial has been once opened for testing purposes, obviously the contents are unavailable for subsequent use. It would be, therefore, a work of supererogation to include in the Pharmacopœia a test which, in the first place, could not be performed by one retail pharmacist in the kingdom; and, secondly, if he were able to perform it, the result obtained from testing one vial would be no guarantee as to the contents of the other vials. It appears therefore to be evident that a biological test for general use is out of the question.

With regard to freedom from bacteria and the amount of antiseptic, it would be quite competent for a pharmacist to undertake tests for these; but they are only secondary, and if the primary test of identification is not to be included, there is, doubtless, little need for specifying any other test. The usual bacteriological test consists in adding 10 per cent. of serum to sterile melted agar-agar and the mixture poured on a sterile glass plate. If the serum be free from bacteria, no colonies should appear. The usual antiseptic is trikresol, 0.4 per cent. giving the best results. Some manufacturers use formaldehyde, but this must be present in very small percentage, otherwise it makes the injection of the serum painful. If too much antiseptic be added the appearance, and probably also the quality, of the serum is

altered either by turbidity or viscosity. In the case of trikresol, its comparatively harmless nature gives it special recommendations.

With regard to the age of the serum it is quite necessary to specify outside every package the date when the test was made. It is well known that anti-diphtherial serum deteriorates with the lapse of time. The cause of this deterioration has not yet been ascertained, but it is known that its rate is by no means uniform. As a general rule, it may be stated that very little deterioration takes place within the first six months, and many bulbs of serum have been tested after a year, and even much longer, which have shown comparatively little deterioration. At the same time, it is also known that in other instances considerable deterioration has taken place, and so far as our present knowledge of the subject goes, it is impossible for us to state on a label what will be the actual potency of a vial of serum at any future date. The utmost that we can do is to make sure, as far as possible, that the serum shall always be above the dose specified on the label, and for that purpose the best way is undoubtedly to add at least 25 per cent. more serum than the quantity actually required to give the labelled dose at the time of bottling. If this be done there is good reason for believing that the dose stated on the label will always be available provided the contents be used within from nine to twelve months. This means, of course, that the actual contents at the time of bottling give a much larger dose than is stated on the label, but when we know that serum is perfectly harmless, no matter in what quantities it may be given, it is quite clear that this practice would keep us on the safe side.

In order to prevent deterioration as much as possible serum should be stored, as directed in the German Pharmacopœia, in a cool and dark place, the best temperature being between 32° and 50°F. (0° and 10°C.).

A consideration of all the conditions of the case leads to the positive conclusion that anti-diphtherial serum ought to be officially recognized in the Pharmacopœia, and that, in order to have a satisfactory guarantee, the most feasible plan is that adopted in Germany—namely, to have an official certification of every container. As has already been stated, this is not only quite practicable, but is apparently the only practicable method. It may not be practicable, as it certainly is not essential, to have a Government laboratory for the preparation of serum, but it is perfectly practicable to have a laboratory where all needful tests could be



carried out, and where arrangements could be made to have the serum filled and every container properly certified by the official appointed for the purpose. Whether this official be appointed by the Government or by the General Medical Council, he ought to be a man of eminence as a bacteriologist and pharmacologist, and one whose certificate would be accepted absolutely without question.

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Mr. Martin pointed out that the committee appointed by the Pharmaceutical Society had no voice whatever as to what should be introduced into the Pharmacopœia.

On the motion of the Chairman, Mr. Maben was cordially thanked for his paper.

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The following paper was then read by Mr. Bird :—

### LIQUOR KRAMERIÆ CONCENTRATUS, B.P.

By F. C. J. BIRD.

Concentrated Solution of Krameria, B.P., occupies a prominent position in that section of the concentrated liquors of the Pharmacopœia which on their first introduction gained an unenviable notoriety on account of proneness to deposit and general unsatisfactory nature. As has been shown, however, in a previous paper communicated to the Conference, this undesirable tendency to change on keeping—at least, as regards senega and calumba—can by comparatively simple modification of the respective formulæ be entirely overcome, and it was thought probable that an inquiry into the causes which might be supposed to contribute to the want of stability of the Krameria Liquor would lead to useful results.

Liquor Krameriaë Conc., carefully prepared by the official process, is a clear liquid of a deep ruby-red colour in thin layers, and characteristic odour; it has when freshly made a specific gravity of from 1·007 to 1·016. On dilution with water it either precipitates or forms a cloudy solution. The extractive varies from 7 to 10 Gm. per 100 c.c., and the alcohol is usually about 18 to over 19 per cent. by volume. Change often commences, however, even within a few days after preparation; the liquid loses its brightness, becomes opalescent, and finally throws down a reddish-brown precipitate, which increases in volume as time goes on. Under certain conditions the liquid has been known to become

gelatinous and nearly solid. The deposit can be redissolved in warm 20 per cent. alcohol to an astringent solution; the effect of the precipitation is obviously to diminish the medicinal value of the liquor as well as alter its analytical characters.

Experiment indicated two principal causes as being answerable for this defect, viz. development of acidity and decrease of temperature. To confirm this observation, a sample of Liquor *Krameria* Conc. was prepared as follows:—The moisture was first determined in some Peruvian rhatany root, which had been reduced to No. 40 powder. This amounted to 8.9 per cent. Sufficient extra 90 per cent. alcohol was then added to the portion of menstruum used for moistening the *krameria* to convert the moisture into 20 per cent. alcohol, any possibility of clouding of the percolate due to extraction with a varying strength of menstruum being thus avoided. The process was continued according to the B.P. in apparatus so arranged as to avoid any loss of alcohol. The finished product was quite brilliant, and possessed the following characters:—Specific gravity, 1.015; alcohol, 19.46 per cent. by volume; extractive, 10.38 Gm. per 100 c.c.

After one pint had been collected (using B.P. quantities) percolation was continued to exhaustion, the percolate being collected in fractions of 10 fl. oz., and the amount of extractive in each determined in order to ascertain the effectiveness or otherwise of the B.P. method in its application to *krameria*.

|                                            | Extractive<br>Gms.<br>per 100 c.c. | Percentage of Extractive<br>removed, taking Total<br>Soluble Matter in Root<br>as = 100. |
|--------------------------------------------|------------------------------------|------------------------------------------------------------------------------------------|
| 20 fl. oz. Liq. <i>Kramer.</i> Conc., B.P. | 10.38                              | 69.9                                                                                     |
| 10 fl. oz. First Fraction . . . .          | 3.5                                | 11.8                                                                                     |
| 10 fl. oz. Second Fraction . . . .         | 2.38                               | 8.1                                                                                      |
| 10 fl. oz. Third Fraction . . . .          | 1.48                               | 4.9                                                                                      |
| 10 fl. oz. Fourth Fraction . . . .         | 0.84                               | 2.8                                                                                      |
| 10 fl. oz. Fifth Fraction . . . .          | 0.46                               | 1.5                                                                                      |
| 10 fl. oz. Sixth Fraction . . . .          | 0.3                                | 1.0                                                                                      |

It will thus be seen that in this instance the B.P. process extracts about 70 per cent. of the available soluble matter of the root, and is not so efficient as in the case of *senega*, which latter drug yields by the same method over 95<sup>1</sup> per cent. of its soluble constituents.

<sup>1</sup> *Year-Book*, 1901, p. 426.

*The Effect of Excessive Acidity in Promoting Decomposition.*—Liq. *Krameria* Conc. is naturally acid in reaction, owing to the presence of rhatania tannic acid; this constituent, together with rhatania-red, probably taking part in any change which the liquor may undergo. Although its glucosidal nature is open to doubt, rhatania tannic acid is decomposed by dilute acids with production of rhatania-red, a substance of difficult solubility. The addition of a little acetic acid to Liq. *Krameria* Conc., B.P., causes the deposition of a very considerable precipitate after the expiration of twenty-four hours, and it is reasonable to suppose that the development of extra acidity does effect the keeping qualities of the preparation.

*The Influence of Changes of Temperature.*—Liq. *Krameria* Conc. prepared at 60°F. is apparently a fully saturated solution of one or both of the principal constituents of the root. This view is borne out by the fact that such a liquor cooled to 50° or 45°F. immediately becomes turbid, and if the temperature be still further lowered to near freezing-point, precipitation may be sufficiently copious to cause the consistence of the liquid to verge on the gelatinous. When, therefore, the preparation is subjected to a lowering of temperature for some time a precipitate falls to the bottom of the vessel, and from its position does not redissolve when the temperature of the liquid rises again. Thus a pharmacist's stock of Liq. *Krameria* Conc. stored in a place where the temperature is variable must from this cause be continually losing strength, with consequent diminution of extractive. This may be partly due, in some cases, to solid matter thrown out of solution both by a decrease in the alcoholic content of the liquid and also possible decomposition of krameria tannic acid, with formation of the more insoluble krameria-red, owing to access of acidity developed through fermentative changes. The instability of the B.P. Concentrated Liquors as a class was pointed out more than a year ago<sup>1</sup> by F. Bascombe, who particularly condemned the rhatany liquor, and stated that it had been aptly described as "an excellent coaguline." The figures given were as follows:—

| Sp. Gr. | Extractive after<br>One Week | Extractive after<br>One Year |
|---------|------------------------------|------------------------------|
| 1.008   | 7.47                         | 5.17                         |

The loss in extractive after a year's storage being very considerable.

<sup>1</sup> *Chemist and Druggist*, Jan. 5, 1901, p. 20.

It may be interesting here to record the figures obtained from the recent examination of a sample made soon after the issue of the present Pharmacopœia, and now over three years old :

| Sp Gr.<br>(1899). | Sp Gr.<br>(1902). | (Gms. per 100 c.c.)<br>Extractive<br>(1899). | Extractive<br>(1902) |
|-------------------|-------------------|----------------------------------------------|----------------------|
| 1 018             | 1 001             | 91                                           | 5.9                  |

Other commercial samples examined on various occasions showed great variation.

| Sp Gr. | Extractive.     |
|--------|-----------------|
| 0 998  | 5.8             |
| 1 008  | 6.84            |
| 0.996  | 4.4, etc., etc. |

This want of uniformity is doubtless due to the causes already considered, and not necessarily to faulty preparation in the first instance.

From a consideration of the foregoing facts the only likely method of improvement appeared to lie in the incorporation with the finished B.P. product of some better solvent of the constituents of *krameria* than the B.P. menstruum, which should be capable of maintaining the solution permanent at all temperatures. After some preliminary experiments the following processes were tried :—

PROCESS A.—A sample of Liq. *Kramerizæ* Conc. was prepared exactly as described in the earlier part of this note, but the first  $\frac{1}{20}$  of the percolate was reserved. The remaining  $\frac{19}{20}$  was collected separately, evaporated on a water-bath to a soft extract, and taken up in sufficient 90 per cent. alcohol to give the required final volume when added to the reserved percolate.

PROCESS B.—As A, but with an amount of glycerin equal to  $\frac{1}{20}$  of the finished volume added to the last  $\frac{1}{20}$  of the percolate, the mixture evaporated on a water-bath, and added to the reserved percolate. Contains about 5 per cent. of glycerin.

PROCESS C.—As B, but with  $\frac{1}{10}$  only of the percolate reserved, and double the amount of glycerin used. Contains about 10 per cent. of glycerin by volume. The products of the various processes were then compared as follows :—

|           | Sp. Gr. | Extractive.<br>Gms per 100 c.c | Alcohol.<br>By Vol |
|-----------|---------|--------------------------------|--------------------|
| B.P.      | 1.015   | 10.88                          | 19.46              |
| Process A | 1.012   | 10.8                           | 22.8               |
| Process B | —       | —                              | —                  |
| Process C | 1.045   | 20.92                          | 17.2               |

*Acidity.—Samples Slightly Acidified with Acetic Acid and Allowed to Stand for a Few Days :—*

|                                       |                           |
|---------------------------------------|---------------------------|
| B.P. Product . . . . .                | Considerable precipitate. |
| Process A (5 per cent. alcohol) . .   | Slight deposit.           |
| Process B (5 per cent. glycerin) . .  | Very slight deposit.      |
| Process C (10 per cent. glycerin) . . | Brilliant—no deposit.     |

*Temperature.—Samples Exposed to a Temperature of about 32°F.*

|                        |                                                  |
|------------------------|--------------------------------------------------|
| B.P. Product . . . . . | Copious turbidity and precipitation.             |
| Process A . . . . .    | Turbidity and precipitation, but in less degree. |
| Process B . . . . .    | Turbidity.                                       |
| Process C . . . . .    | Remains clear, no precipitation.                 |

On dilution with water there was distinctly less turbidity with the samples containing glycerin, whilst the taste was rather more agreeable, and the astringency practically the same. Glycerin has evidently a very notable solvent effect on those principles of *krameria* which readily fall out of solution, for the solid deposit collected from an old sample of liquor formed a permanent solution in warm 20 per cent. alcohol, containing a little glycerin. Without glycerin the solution became turbid and reprecipitated on cooling.

Samples kept under ordinary conditions since the date of preparation, some months ago, exhibit similar differences, the B.P. product having thrown down a precipitate, whilst C is free from deposit and quite bright. A and B are intermediate.

#### CONCLUSIONS.

Precipitation and loss of extractive characterize Liq. *Krameria* Conc. when prepared by the B.P. method, at the usual temperature of the laboratory, and stored under ordinary conditions.

Such changes may be attributed chiefly to variations of temperature, and partially, in some cases, to decrease in alcoholic strength with development of extra acidity.

If the introduction of any other solvent but alcohol be open to objection, then considerable improvement results from the incorporation of about 5 per cent. extra alcohol in the B.P. product, care being taken to avoid loss of alcohol in manufacture. But if 10 per cent. of glycerin in the finished preparation be considered admissible, then by far the best results are obtained by Process C, the product of which possesses all the good qualities that the

present B.P. preparation has been shown to lack. The advantages of 5 per cent. of glycerin (Process B) are not sufficiently marked to warrant its recommendation.

Mr. J. C. UMNEY asked whether Mr. Bird had determined the nature of the action of the glycerin on the constituents of krameria. The peculiar effect of glycerin in delaying pectinisation in preparations of kino was well known, but it was singular that the solid residue in these cases did not correspond with what was naturally expected. The kino appeared to hold a portion of the glycerin while another portion had been dissipated. Probably a similar reaction took place with krameria preparations.

Mr. J. R. HILL said glycerin did not prevent pectinisation in kino preparations, and the solid substance that remained was no longer kino. It had little astringency, and was easily soluble.

Mr. BIRD, in reply, said the point brought forward by Mr. Umney had occurred to him when working out his experiments. He had tasted the four krameria preparations when diluted with water, and whilst those containing glycerin were distinctly more agreeable to the palate, he could detect no appreciable difference in astringency.

The CHAIRMAN conveyed the thanks of the meeting to Mr. Bird for his interesting paper.

The following paper was then read by Mr. Macdougald, and by the assistance of lantern slides illustrations were thrown upon a screen.

## NEW APPARATUS FOR MILK ANALYSIS.

BY G. D. MACDOUGALD, F.I.C.

All attempts to fill the gap between purely laboratory methods of milk analysis and the old methods as used in dairy factories have practically been confined to methods involving the use of centrifugal machines for volumetric determination of the fat.

The ordinary laboratory methods were, and still are, troublesome and expensive. The analyst wants from 10s. to 20s. per sample for his professional assistance; while the dairyman can scarcely afford the same number of pence.

For reasons which are difficult to define, these volumetric pro-

cesses have not been considered so reliable as those in which the fat is separated and weighed.

The centrifugal methods of milk analysis are looked upon in the analytical world very much as a dentist might look on a steam machine for extractions, or as a pharmacist might look on a penny-in-the-slot dispensing apparatus.

Notwithstanding the prejudice against machines, I think that in the hands of an operator fully cognizant of possible sources of error arising out of the particular working conditions, the centrifugal methods are reliable. Any doubt which is thrown on results obtained by centrifugal machines arises from the fact that they are as a rule worked by persons not so skilled in analytical manipulation as to inspire confidence. I do not mean to say that the ordinary worker is careless, but the fact that the apparatus is supposed to be workable by any person having had half an hour's instruction is sufficient to raise suspicion in the mind of such a superior person as an analyst.

I am aware that this explanation does not fully cover the ground, for explain it as one may, the average analyst looks with suspicion on the work of another analyst who uses a centrifugal method, be it ever so perfect, as I have reason to know, for I have worked a great deal with such methods. This state of matters arises, I think, as a natural corollary, keeping in view the slight deficiencies in human nature, for one analyst thinks another has no business to carry out work with a purely factory process, even although he is probably aware that in expert hands such processes give accurate results.

For many years I have endeavoured to invent new apparatus, having in view greater rapidity and consequent cheapening of the work of the professional milk analyst without sacrificing accuracy. I have endeavoured to divert work into the laboratory of the professional analyst which is best done there, but which hitherto has been done outside.

I have tried to improve and render more automatic the already quick centrifugal or volumetric methods. I have also spent a good deal of time at the quickening of gravimetric processes, of which the Adams is the type, and also processes, of which the Werner-Schmidt is the type. It is to my attempts in the last-mentioned direction that I will now direct your attention. To the work of the machines I am about to describe no exception, I think, can be taken by the most critical analyst. I may say that this machine, or series of machines, has already assisted in the per-

formance of nearly 20,000 analyses of milk in two years, for which it is needless to say, I have not received a guinea per sample. The results are, if anything, more reliable than the ordinary standard laboratory work, because all the milks are treated by the apparatus in precisely the same way, and idiosyncrasy of hand operation is to a large extent eliminated.

From one point of view the machines have a fault. They are complicated, and have as many parts as two or three typewriting machines put together, and are therefore more costly than any milk apparatus I am acquainted with. On the other hand, they do their work perfectly, and are open to no objection on the question of accuracy.

To any one who has experience of the Adams and Werner-Schmidt processes it may appear a difficult problem to evolve an apparatus for gravimetric work based on one or other of these processes, and of sufficient rapidity to enable an analyst to help clients wishing his assistance at such fees as the industry can afford. I think, however, I have, after some years' labour, in a sense solved the problem.

Amongst a number of diagrams thrown on the screen by the reader of the paper, the following may be selected as sufficient to give a fairly clear idea of the new apparatus:—

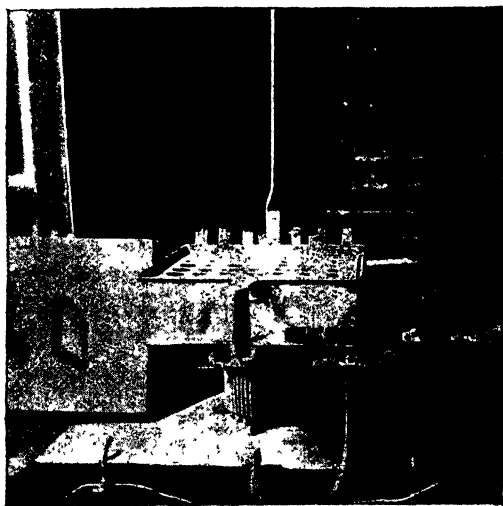
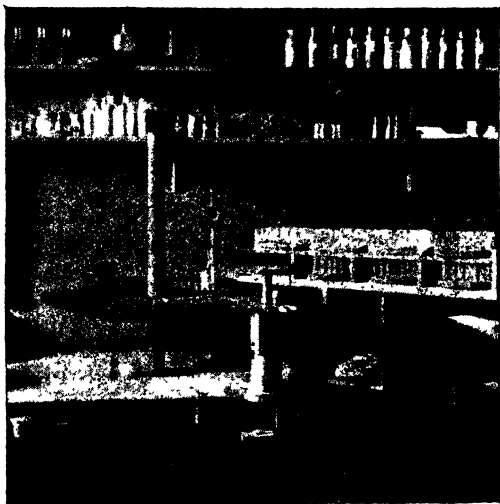
In the first diagram may be seen two toothed wheels provided with means for gearing with each other. The larger of these wheels is provided with as many teeth as the number of samples to be operated on at a time. The apparatus shown in the diagram is constructed to work forty-eight or any less number at a time. Each tooth of the large wheel is capable of holding a tube containing a milk under treatment.

The smaller wheel may conveniently have twelve teeth. Above the small wheel is a circular platform supported by a central shaft moving freely in the boss of the small wheel. This platform is capable of moving step by step with the wheel, and also capable of movement vertically. Its vertical movement is regulated by a tapering piece of metal seen somewhat lower down to the right.

Between the great and small wheel there may be observed suspended by a cord what, for want of a better name, I have called the eductor. It consists of two parts—one for closing the mouth of the tube containing the milk assay and communicating air under pressure to the surface of the liquid by means of the tube seen in the diagram. The other part consists of a tube called the eductor

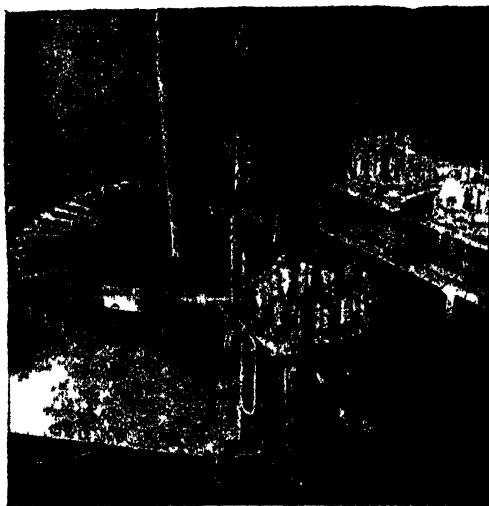


tube, of fully a millimetre bore, and capable of sliding nearly air-tight in a vertical direction through the portion of the apparatus closing



the assay tube orifice. This narrow eductor tube is also capable of slight rotation about its vertical axis. The top of the eductor tube

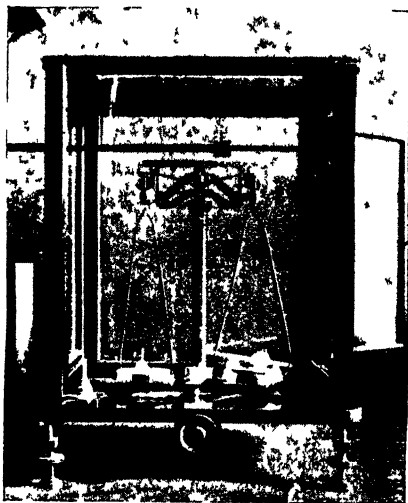
is bent over until it is vertically within the circumference of the platform on the top of the small-toothed wheel.



To the left of the diagram may be seen, on a specially constructed shelf, eight circular trays, holding each in position twelve

marked and tared beakers of small size. Ninety-six beakers are shown, equivalent to twice the number of assays that the great wheel will accommodate. This permits of the operator running up to ninety-eight milks without stopping the apparatus for cleaning.

The manipulation is as follows:—On a specially constructed balance, gravities are taken. A specially graduated pipette is used to transfer 5 Gm. to bulb tubes. Forty-eight or any less number are thereafter treated to a definite volume of acid, and all are boiled together in a pan. From the boiling-pan they are transferred to the great wheel and “ethered,” a definite volume of ether being added. The wheel is rotated to facilitate the opera-



tion. A motion on the wheel, which is soon acquired, causes the heavy bottom liquid to mix with the ether. Water is added to bring the mark of separation to a narrow neck on each tube. A circular tray with its complement of beakers is now placed on the platform, and as this platform is rotated each beaker receives from the eductor tube the fatty ethereal solution corresponding to its number. To prevent over-running during rotation, that is to say, for instance, to prevent the ethereal fatty solution of No. 13 being inadvertently run into No. 1, a stop seen in the diagram arrests the platform at the completion of every revolution, when a new tray is substituted, and so on until the last milk is treated. The whole now receive a second, and, if not closely separated, a third

ether. The beakers are now placed together in a distilling apparatus and the ether recovered. They are subsequently heated and weighed.

Mr. NAYLOR asked how long a time it occupied to conduct the heating process when the acid was brought in contact with the milk, and how did they know exactly when the heating process was accomplished, and beyond which overheating would result. He also asked whether the milk had to be heated longer provided it contained a larger quantity of casein.

Mr. TYRER asked what was the motive power used for the apparatus.

Mr. MACDOUGALD said there was practically no difference between his process and the Werner-Schmidt process as regarded preliminary boiling. Any one who had worked with the Werner-Schmidt process knew that there was a very considerable latitude in the boiling. They had simply to boil and observe when the fat came to the top and the globules coalesced. When that happened they could stop the boiling. The usual time was eight minutes, but the other day he found a tube had been boiled about fifteen minutes, and it was all right, because he repeated it. With reference to the motive power, he at one time kept a boy to blow with an ordinary pair of Fletcher's bellows, but as boys were not easily got when wanted he used an ordinary aspirator which gave as much pressure as was required.

. A cordial vote of thanks was passed to the author for his paper.

The following contribution from St. Thomas's Hospital was read by Mr. White:—

### BISMUTH SALTS IN MIXTURES.

By EDMUND WHITE, B.Sc., F.I.C.

During the revision of the *St. Thomas's Hospital Pharmacopæia*, a new edition of which is in the press, this subject came under my notice, and a series of experiments was undertaken to devise a more satisfactory formula than the one in use. This contained the following:—

|                                |                   |
|--------------------------------|-------------------|
| Bismuth oxynitrate . . . .     | 15 grains.        |
| Sodium bicarbonate . . . .     | 15 „              |
| Mucilage of gum acacia . . . . | 1 fluid drachm.   |
| Water . . . . .                | to 1 fluid ounce. |

The mixture, as is well known, evolves carbon dioxide, which is due to liberation of nitric acid by prolonged contact of the oxynitrate with water. The deposit undergoes also marked physical changes, the minutely crystalline bismuth salt finally forming lumps which are not afterwards evenly diffusible by agitation. This is undoubtedly due to the presence of the gum acacia, and the substitution of compound tragacanth powder improves matters somewhat, but the deposit in this case becomes slimy and unsightly. It was found that after effervescence the filtrate from the mixture was reduced in alkalinity to an extent corresponding to the disappearance of nearly four grains of sodium bicarbonate.

Another sample of this mixture, omitting the mucilage, gave the following results:—

(a) If filtered immediately after mixing, the filtrate possessed the full neutralizing power of the bicarbonate.

(b) After one hour, effervescence being finished, 25·6 per cent. of the bicarbonate had been neutralized. This corresponds to the full quantity of nitric acid combined in the bismuth oxynitrate.

(c) The precipitate contained 8·49 per cent. of combined carbonic anhydride, which indicates that the whole of the oxynitrate had been converted into oxycarbonate of the official formula.

It has been sometimes stated that bismuth oxynitrate given in this way is, therapeutically, more efficient than the oxycarbonate, but I have been unable to find any definite evidence, either from books or from consultation with physicians, in support of this statement. One curious fact I have noticed is that when bismuth salts are given with compound infusion of orange-peel no suspending agent is necessary. This result is hardly explicable on the viscosity of the liquid, but there is no doubt that this infusion forms an ideal vehicle for bismuth mixtures, since the absence of fermentable gum is a great advantage in the cases of gastric disturbance, for which bismuth salts are given. With water or aromatic waters as vehicle I prefer the use of simple tragacanth powder as suspending agent 1 Gr. per fluid ounce, to either gum acacia or compound powder of tragacanth.

On further consideration it appeared to me that if the value of

bismuth salts, as is generally assumed, depends upon the formation of a sedative coating on the gastric mucous membrane, the bismuth salt should be as finely divided as possible. Under the microscope the oxynitrate appears distinctly crystalline, and the particles are distinctly larger than those of bismuth oxycarbonate. The freshly precipitated and moist oxycarbonate, examined in the same way, appears in a very much finer state of sub-division than the stock oxynitrate or oxycarbonate, and a mixture containing this has for some time past been in use in St. Thomas's Hospital with eminently satisfactory results. In order to render this method of administration practicable the following preparation was devised :—

## GLYCERINUM BISMUTHI CARBONATIS.

|                              |         |
|------------------------------|---------|
| Bismuth oxynitrate . . . . . | 60 Gm.  |
| Nitric acid . . . . .        | 40 c.c. |
| Water . . . . .              | 25 c.c. |

Dissolve the oxynitrate in the acid previously mixed with the water and pour the solution into a solution containing •

|                              |          |
|------------------------------|----------|
| Ammonium carbonate . . . . . | 55 Gm.   |
| Water . . . . .              | 300 c.c. |

Collect the precipitate on a calico filter, wash well, drain, and rub the moist precipitate with

Glycerin, a sufficient quantity to produce 100 c.c. of fluid.

This will contain 1 Gm. of bismuth oxycarbonate in 2 c.c., or about 15 Gr. in 30 minims. The suspended bismuth salt is easily and evenly diffused in the glycerin by agitation.

This may be prescribed with water, aromatic waters, or compound infusion of orange-peel, and the suspension is perfect in each case, without any addition of gum, owing to the minute state of division of the bismuth salt.

Incidentally I may mention that this glycerin of bismuth carbonate forms an ideal cosmetic for irritable conditions of the skin and thus constitutes a useful toilet preparation.

Mr. TYRER said that Mr. White's paper was at the present moment of especial interest. As one of a number of manufacturers of bismuth preparations, he noticed that in recent years the tendency had been to prescribe bismuth carbonate. Time was

when bismuth carbonate was heavier than the oxynitrate, but since the demand for the carbonate had so largely increased manufacturers had endeavoured to produce as light a salt as possible. They must remember that in chemistry the phrase "strictly pure" was a phrase. They must not forget how long a time it took Staas to find the atomic weight of pure silver, and this ought to apply to the other elements. It had come to pass, however, that within the past three years increasingly superior preparations of bismuth carbonate had been produced—so much so that to send out now heavy carbonate was to bring down condemnation from the customer. He held that the bismuth salts did not require the adventitious aid of mucilages. He did not dispute the fact that the glycerole of bismuth produced by Mr. White was an excellent preparation, but it should not be forgotten that it was not particularly easy to deal with an emulsion or glycerole of bismuth which contained an appreciable trace of nitric acid.

Mr. JAMES MACKENZIE, Edinburgh, said doctors sometimes insisted on prescribing subnitrate of bismuth with bicarbonate of soda, but there is now a growing tendency to order the carbonate of bismuth instead with better results.

Mr. GERRARD said from a therapeutic point of view the action of bismuth was more mechanical than otherwise. It seemed to act as a mechanical sedative on the coating of the stomach, but the stomach contained acids, and it would be easily understood that acids acted more readily on the carbonate than on the subnitrate. He had experienced the same mechanical difficulty in the diffusion of subnitrate in mixtures, and had urged the authorities for whom he dispensed at the time to use the mucilage of tragacanth instead of acacia for the diffusion of bismuth salt.

Mr. J. R. HILL said there were distinguishing differences between subnitrate and subcarbonate of bismuth. The subnitrate is more astringent, and this astringency appeared to be desired by therapists. Further, they must not forget that the subnitrate of bismuth is by no means insoluble. It dissolved much more rapidly than the subcarbonate.

Mr. PETER BOA said if Mr. White had settled by his formula the vexed question of this bismuth combination, he had occasioned a distinct loss to journalistic literature. The matter had been discussed for years. One section of the critics said the heavier salt was the better to use, while another said the lighter was preferable. He was inclined to think there was

something to be said on both sides. In mixtures such as that under discussion it is well to remember that there is in the one case a distinct alkalinity, in the other there is none. He agreed with Mr. Rutherford Hill that bismuth subnitrate dissolves more readily than the subcarbonate in water. That may arise from some condition in the course of manufacture. With the oxynitrate there is always a more or less acid condition. He held the opinion that all suspending agents for bismuth salts are bad. With a reasonably light salt of bismuth there is no necessity for a suspending agent. All pharmacists will have noticed that oxynitrates vary considerably in density, and the tendency in practice is to use the lighter salt.

Mr. WHITE said he had endeavoured to trace the origin of the formula and the reason for its preference amongst prescribers, but had not been able to do so.

A cordial vote of thanks was passed to Mr. White for his paper.

In the absence of the author, the following paper was then read in abstract by Mr. J. Rutherford Hill.

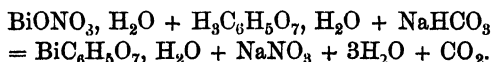
### BISMUTH CITRATE AND LIQUOR BISMUTHI.

BY WILLIAM DUNCAN, PH.C., F.C.S.

In a paper published in May last I stated that bismuth citrate is more of the nature of an acid than a salt of bismuth, forming with alkalies, not double citrates, but bismuthyl-citrates, analogous to antimonyl-tartrates. Since then it has been suggested that I might give my reasons for such a statement—hence this communication.

The subject of liquor bismuthi has been so frequently and recently discussed at past Conferences that it is unnecessary to refer to the various methods suggested for preparing the citrate and its liquor further than to mention the process I follow for obtaining the salt.

Molecular weights in grains or grammes of bismuth subnitrate, citric acid, and sodium bicarbonate are taken in accordance with the following equation:—





Place the bismuth subnitrate and citric acid in a mortar and mix with sufficient water to form a cream. Set aside for two hours, occasionally stirring, or until a little of the mixture forms a clear solution with ammonia; then add the sodium bicarbonate mixed with a little water, allow effervescence to cease, and finally wash the citrate.

The variableness of commercial bismuth subnitrate introduces a difficulty in preparing a nitrate-free citrate—a difficulty I have not met with when metallic bismuth, its oxide or carbonate, is used. As the formula  $\text{BiONO}_3, \text{H}_2\text{O}$  probably does not represent the commercial salt, the product may not be entirely soluble in ammonia. Deficiency either in citric acid or sodium bicarbonate causes nitrate contamination, and, while the bismuth citrate dissolves, the nitrate does not.

For complete success exact equivalents must be used. There must be sufficient citric acid to combine with the whole of the bismuth and sufficient sodium bicarbonate to combine with the whole of the nitric radical. These conditions can be secured by making a quantitative analysis of the bismuth subnitrate and calculating, from these results, the quantities of acid and alkali required. This is a tedious process, rendering the making of small quantities of bismuth citrate from subnitrate both laborious and expensive.

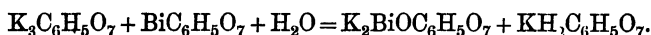
By a slight modification of the process the necessity for a quantitative analysis of the commercial salt may be obviated. This is accomplished by using excess of citric acid to ensure complete conversion of the subnitrate into citrate. The theoretical quantity of sodium bicarbonate, however, must not be increased, as the slightest excess over and above that necessary to neutralize the liberated nitric acid causes great loss of citrate, every grain of sodium bicarbonate in excess causing a loss of three grains of citrate by forming a soluble sodium bismuthyl-citrate.

Bismuth citrate thus prepared is micro-crystalline, very insoluble in water or alcohol, slowly soluble in dilute mineral acids, the solutions not readily precipitating on dilution with water; soluble in alkaline citrates, the solutions becoming acid, forming clear solutions with effervescence in alkaline carbonates and bicarbonates, and readily soluble in hydroxides of the alkalies.

The acid character of bismuth citrate was suggested by observing the reaction between it and sodium carbonate. When molecular weights in grains of the two salts are mixed with water and allowed to stand, effervescence slowly sets in, and a perfect neutral

solution is formed which does not precipitate on boiling. When two molecules of sodium carbonate are mixed with one molecule of bismuth citrate under similar conditions a clear solution is also obtained, but it is alkaline, and on boiling there is a precipitation of bismuth oxycarbonate. When two molecules of bismuth citrate are mixed with one molecule of sodium carbonate under the same conditions a portion of the bismuth salt remains undissolved, and the undissolved portion is unchanged bismuth citrate.

These results are explained by assuming that so-called bismuth citrate really plays the part of a dibasic acid. If its solubility in alkaline solutions be due to the formation of a double citrate there should be a separation of oxycarbonate when sodium carbonate solution is treated with excess of bismuth citrate. That such is not the case is proved by the ready solubility of the undissolved residue in ammonia. This assumption also explains the solubility of bismuth citrate in neutral alkaline citrates and the acid reaction of the resulting solutions. If molecular weights in grains of bismuth citrate and neutral potassium citrate are gently heated in excess of water till solution is effected, the resulting solution is strongly acid, and the quantity of potassium hydroxide required to again establish neutrality corresponds to the quantity required to convert potassium dihydric citrate into normal potassium citrate, as is seen in the following equation:—



This reaction accounts for the preservative property of ammonium citrate in the official liquor.

Confirmation of the acid nature of bismuth citrate was further sought by attempting the formation of other compounds. A quantity of the salt was dissolved in a weak solution of ammonia. To one portion of the solution was added silver nitrate, to another lead nitrate, and to a third barium nitrate. A precipitate was formed in each case, and the precipitates were readily soluble in excess of ammonium citrate. The silver precipitate was soluble in ammonia, the lead and barium precipitates insoluble. The precipitates, after washing, were examined and found to contain bismuth citrate in combination with the metal. The barium precipitate was digested with ammonium sulphate and formed barium sulphate, the bismuth citrate again passing into solution as an ammonium salt.

The barium and bismuth were quantitatively determined in the barium compound with the following results:—3.168 Gm. of the

dried salt yielded 1.502 Gm. bismuth sulphide,  $\text{Bi}_2\text{S}_3$ , and 1.311 Gm. barium sulphate,  $\text{BaSO}_4$ . This quantity of a salt having the formula  $\text{BaBiOC}_6\text{H}_5\text{O}_7$  would yield theoretically 1.476 Gm.  $\text{Bi}_2\text{S}_3$  and 1.341 Gm.  $\text{BaSO}_4$ .

A quantity of freshly-made bismuth citrate was dried for a week in a sulphuric acid desiccator, and the following experiments carried out:—

0.8802 Gm. of the salt was heated to  $110^\circ\text{C}$ . for three hours and weighed. It weighed 0.835 Gm., indicating a loss of 0.0452 Gm., equal to a loss of 5.13 per cent. of water. The 1885 Pharmacopœia gave the formula  $\text{BiC}_6\text{H}_5\text{O}_7$  for bismuth citrate, but, in the characters and tests, described it as "usually containing  $2\frac{1}{2}$  per cent. of absorbed moisture." A salt having the formula  $\text{BiC}_6\text{H}_5\text{O}_7, \text{H}_2\text{O}$  contains 4.33 per cent. of water. To make certain that this loss was not due to decomposition of the citric radical the anhydrous salt was mixed with water, the metal removed by sulphuretted hydrogen, and the boiled filtrate examined for citric acid, which was proved to be present. A greater loss was observed on heating to  $130^\circ\text{C}$ ., but as the salt showed distinct change of colour at this temperature it was inferred that decomposition had begun, and the product was not further examined. The anhydrous salt is not so quickly soluble in hydroxides of the alkalies as the freshly precipitated citrate, and is more easily decomposed by excess of alkalies.

1.5 Gm. of the salt was burned, and gave 0.8372 Gm. of oxide. A salt having the formula  $\text{BiC}_6\text{H}_5\text{O}_7, \text{H}_2\text{O}$  should yield 0.839 Gm. of oxide, while a salt having the formula  $\text{BiC}_6\text{H}_5\text{O}_7$  should yield 0.865 Gm.

1.501 Gm. of the salt was diffused in water and completely decomposed by sulphuretted hydrogen, yielding 1.018 Gm. of sulphide  $\text{Bi}_2\text{S}_3$ . The filtrate and washings, boiled to expel  $\text{H}_2\text{S}$  on titration with N/10 NaOH yielded 0.6619 Gm. citric acid calculated as anhydrous. A salt having the formula  $\text{BiC}_6\text{H}_5\text{O}_7, \text{H}_2\text{O}$  should yield 0.92 Gm.  $\text{Bi}_2\text{S}_3$  and 0.692 Gm.  $\text{H}_3\text{C}_6\text{H}_5\text{O}_7$ . A salt having the formula  $\text{BiC}_6\text{H}_5\text{O}_7$  should yield 0.96 Gm.  $\text{Bi}_2\text{S}_3$  and 0.725 Gm.  $\text{H}_3\text{C}_6\text{H}_5\text{O}_7$ .

This method of determining the composition of the salt is beset with difficulty. Owing to the insolubility of the bismuth citrate decomposition with sulphuretted hydrogen is slow. The mixture must be repeatedly boiled and the sulphuretted hydrogen repeatedly passed through before conversion into sulphide is complete. Any undecomposed citrate in the sulphide can be readily detected by

washing out with a little ammonia. Such treatment increases the risk of oxidation in the sulphide, and explains the high readings invariably got by this process.

The acid nature of bismuth citrate being now apparent, the following experiments were carried out to determine its basicity. To known weights of the salt excess of weak solutions of NaOH, KOH, and  $\text{NH}_4\text{OH}$  of known strengths were added. The excess of alkali over and above that required to form neutral solutions with the weight of bismuth citrate taken was determined by titrating with decinormal solution of citric acid. Litmus was used as an indicator in the case of ammonia, and phenol-phthalein in the cases of potassium and sodium; it having been previously found that bismuthyl-citrates of the alkalies are neutral to these indicators.

0.2758 Gm. bismuth citrate (bismuthyl-citric acid) combined with 0.026 Gm.  $\text{NH}_3$ . An acid having the formula  $\text{H}_2\text{BiOC}_6\text{H}_5\text{O}_7$  requires 0.022 Gm.  $\text{NH}_3$ .

0.2978 Gm. bismuth citrate combined with 0.081 Gm. KOH.  $\text{H}_2\text{BiOC}_6\text{H}_5\text{O}_7$  requires 0.073 Gm. KOH.

0.7669 Gm. bismuth citrate combined with 0.149 Gm. NaOH.  $\text{H}_2\text{BiOC}_6\text{H}_5\text{O}_7$  requires 0.145 Gm. NaOH.

These results were confirmed by determining the quantity of the alkali bicarbonates required to form clear solutions with a definite weight of bismuth citrate. Four Gms. of bismuth citrate gave a clear solution with 0.8 Gm. lithium carbonate, 1.7 Gm. sodium bicarbonate, and 2 Gm. potassium bicarbonate. These solutions are precipitated by barium nitrate, and the precipitate undergoes decomposition when treated with the respective alkali sulphates, the bismuth citrate again passing into solution as an alkali bismuthyl-citrate.

These experiments, I think, establish the assumption made at the outset that so-called bismuth citrate is in reality a dibasic acid. That it is, in short, citric acid in which one of the carboxyl hydrogens is replaced by the radical bismuthyl,  $\text{BiO}$ , and that its formula is  $\text{C}_3\text{H}_4\cdot\text{OH}(\text{COOH})_2$ ,  $\text{COOBiO}$  or  $\text{H}_2\text{BiOC}_6\text{H}_5\text{O}_7$ , forming salts with the metals having the general formula  $\text{M}_2\text{BiOC}_6\text{H}_5\text{O}_7$ .

Bismuthyl-citrates of the alkalies are fairly soluble in water, especially the lithium and ammonium salts. Magnesium bismuthyl-citrate and the bismuthyl-citrates of the alkaline earths are much less soluble. All are precipitated from aqueous solution by alcohol apparently in an anhydrous condition. I have succeeded in crystallizing the ammonium and sodium bismuthyl-citrates, but have not yet examined them for water of crystallization.

It may be mentioned that analogous salts of bismuthyl-tartaric acid have also been prepared and examined, and I am of opinion that all organic salts of bismuth which give solutions with hydroxides of the alkalies, such as bismuth gallate and bismuth tannate, will prove to be really bismuthyl-acids.

The preparation of bismuth-citrate for the official liquor necessarily involves time and labour, and the use of commercial subnitrate as the source of the bismuth makes the obtaining of an ammonia-soluble, nitrate-free citrate a matter of chance. So impressed have pharmacists become by this fact that few attempt a second time the preparation of the liquor by the official process.

Inquiry of thirty-eight pharmacists brought out the following facts. Thirty-three buy the liquor ready-made, four make it by the 1885 Pharmacopœia process, but admit that they buy the citrate, and one makes it by the 1898 process, sometimes succeeding and sometimes failing to get a water-white solution.

Bismuth citrate by continuous washing or persistent boiling becomes less and less soluble in ammonia, and the commercial salt is rarely free from nitrate. If the liquor is to be purely a solution of ammonium bismuthyl-citrate a chemically pure citrate must first be obtained, or else a process analogous to that for ammonium ferro-citrate adopted. That is to say, freshly-precipitated bismuth hydroxide added to a strong solution of citric acid, the mixture allowed to stand for some time, and solution effected by adding a sufficiency of ammonia. I have tried this method and find it successful, but I regard all such methods as needlessly elaborate, and suggest the following, which I have found invariably successful —

|                         |               |
|-------------------------|---------------|
| Bismuth subnitrate      | 629 grains    |
| Citric acid             | 572 „         |
| Solution of ammonia     | A sufficiency |
| Distilled water to make | 20 fl ounces  |

Mix the bismuth subnitrate and citric acid in a mortar with  $1\frac{1}{2}$  fluid ounces of water, set aside for two hours, occasionally stirring, or until a little of the mixture yields a clear solution with ammonia, then add sufficient solution of ammonia to dissolve, dilute with water to 20 fluid ounces and filter.

This gives a liquor containing ammonium bismuthyl-citrate equivalent to 3 grains of bismuth oxide,  $\text{Bi}_2\text{O}_3$ , or 5 grains of bismuth citrate,  $\text{BiC}_6\text{H}_5\text{O}_7$ , and 1 grain ammonium citrate in each fluid drachm. If the latter be objected to less citric acid can be used, but I prefer liquor bismuthi to contain both ammonium

citrate and alcohol for keeping purposes. If alcohol be not used, recently boiled distilled water is essential.

The presence of ammonium nitrate may be objected to, but, I think, without sufficient reason. The 1867 Pharmacopœia process gave a liquor as rich in ammonium nitrate as in bismuth citrate. The above gives a preparation containing only about 1 grain ammonium nitrate in each fluid drachm, and its presence has no deleterious effect either chemically or medicinally.

The special medicinal value of liquor bismuthi lies apparently in the ease with which the very insoluble bismuth citrate is precipitated from solution by the acid of the stomach as a bulky, easily distributed powder. For this reason greater sedative effects are obtained from the liquor than from equivalent quantities of the official bismuth salts.

This property of the liquor is well illustrated in the following prescription:—

|                                    |                |
|------------------------------------|----------------|
| Solution of bismuth . . . . .      | 1½ fl. ounce.  |
| Dilute hydrochloric acid . . . . . | A sufficiency. |
| Water to make . . . . .            | 6 fl. ounces.  |

Or better still in the following:—

|                                |               |
|--------------------------------|---------------|
| Bismuth subnitrate,            |               |
| Citric acid, of each . . . . . | 2 drachms.    |
| Water to make . . . . .        | 8 fl. ounces. |

In the latter the citrate as it forms is very bulky, and takes months to settle, so that suspending agents are quite unnecessary. Inorganic salts of ammonium do not prevent precipitation of bismuth citrate in the liquor, so that the presence of this grain of nitrate per drachm is immaterial.

The official title "Liquor Bismuthi et Ammonii Citratis" is misleading, inasmuch as it suggests a double citrate. To be chemically correct the title should be "Liquor Ammonii Bismuthyl-citratis." The titles "Antimonium Tartaratum" and "Vinum Antimoniale" do not commit us in any way regarding the constitution of tartar emetic, and the title "Liquor Bismuthi" would be equally non-committing for this liquor.

The statement of the Pharmacopœia under characters and tests, "heated with alkalis evolves ammonia and yields a white precipitate" should read "heated with *excess* of alkalis," as precipitation depends entirely on sufficient alkali being added not only to liberate the ammonia but to decompose the bismuth citrate.

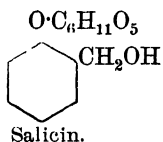
The author was cordially thanked for his paper.

An abstract of the following paper was read by Mr. Ransom in the absence of the authors :

# VARIATIONS IN THE OCCURRENCE OF SALICIN AND SALINIGRIN IN DIFFERENT WILLOW AND POPLAR BARKS.

By H. A. D. JOWETT, D.Sc., AND C. E. POTTER, B.Sc.

In a paper communicated to the Chemical Society two years ago (*Journ. Chem. Soc.*, 1900, **77**, 707) it was shown by one of us that the glucoside obtained from an unknown species of *Salix* was not salicin, but a new substance, which was named salinigrin. It differed from salicin by yielding on hydrolysis, besides glucose, meta-hydroxy-benzaldehyde, instead of orthohydroxy-benzyl alcohol. The chemical relationship existing between the two glucosides is shown by their constitutional formulæ :—



The name salinigrin was chosen because the bark from which it was obtained had been supplied as "black willow," though its identity with *Salix nigra* was doubtful. In order to determine, if possible, the exact botanical source of salinigrin, a considerable number of different species of *Salix* and *Populus*—both European and American—were collected and examined. At the same time the opportunity was taken to determine which species contained salicin or populin. For the very considerable care and trouble taken in the collection of this large number of authentic specimens of *Salix* and *Populus* we wish to express our hearty thanks to the following :—Mr. E. M. Holmes, F.L.S., the Directors of the Botanic Gardens of Cambridge, Kew, and Edinburgh, and the Director of the Missouri Botanical Garden, St. Louis, Mo., U.S.A. For a full account of the work done by former chemists on salicin, and a complete list of references, we would refer those interested to *Die Glykoside*, by van Rijn, pp. 143 *et seq.* From this it appears that salicin has been found in thirteen species of *Salix* and four species of *Populus*, whilst it was absent in eight species of *Salix* and seven of *Populus* examined. In these experiments, however, it would appear that only one factor was considered, viz.

that of different species. There are at least three other factors which may influence the presence of salicin in the tree, viz. locality, time of collection, and sex of the tree. In the present investigation the species selected for selection were the chief European and American ones, hybrids, except in one or two cases, being neglected, and they were collected from different localities. In the course of the investigation results were obtained which rendered it desirable that the two latter factors above-mentioned should be taken into consideration. Accordingly, two species were collected at different seasons of the year, and, in the case of one species, the bark from the male and female trees was separately collected and examined. As the influence of these factors had not been considered when the bulk of the specimens were collected and examined, it has only been possible to determine this in the above-mentioned cases.

#### METHOD OF EXAMINATION OF THE BARK.

In order to ascertain whether the bark contained salicin or a similar glucoside, it was examined according to the following method. A convenient quantity of the bark, not exceeding 1,000 Gm., was extracted by boiling with water for from three to four hours. The infusion was strained, the marc pressed, and the whole liquid then evaporated to a low bulk, generally about one litre. To the concentrated extract a quantity of lead acetate, equal in weight to 10 per cent. of the bark taken, was added, the mixture boiled for a few minutes, and set aside. After standing for half an hour it was strained through calico, and the precipitate well washed with water. The filtrate was then saturated with hydrogen sulphide to remove excess of lead acetate, the lead sulphide filtered off, and well washed with hot water. The filtrate and washings were next evaporated to a low bulk under diminished pressure, and the concentrated liquid then set aside to crystallize. In those cases where an appreciable amount of salicin was present, it crystallized out very readily, and was then drained on the filter pump, washed with a very little cold water, dried on a porous tile, and weighed. In some cases the product obtained was too impure to be considered satisfactory; it was, therefore, recrystallized from the least possible quantity of hot alcohol, the purified product weighed, and the mean of the two weights taken as the amount of salicin contained in the bark examined. When no crystals separated, even after inoculation with a crystal of salicin, the syrupy extract was taken up with dry sawdust (which



had previously been extracted with alcohol), dried in the water oven, and extracted with 90 per cent. alcohol in a Soxhlet apparatus. The excess of alcohol was removed by distillation, and the residue set aside to crystallize.

As this method would not detect traces of salicin, the residue was, if necessary, further treated to determine whether any evidence could be obtained of the existence of salicin by indirect means. This was accomplished by first hydrolyzing the residue with acid and ascertaining whether any glucose was formed, and then by oxidizing the hydrolyzed residue with chromic acid, and testing for salicylic acid. The following method was employed:—The alcoholic extract was diluted with hot water, filtered, and the filtrate diluted to 250 c.c. with water. The amount of glucose in this solution was then determined volumetrically by Fehling's solution in the usual manner. The remainder of the solution was hydrolyzed by boiling with dilute sulphuric acid in a reflux apparatus for one to one and a half hours, and after cooling the amount of glucose again determined in the solution. In this way it was possible to ascertain whether hydrolysis had taken place. The remainder of the liquid, not used for the sugar determination, was boiled with an oxidizing mixture of sulphuric acid and potassium dichromate for three hours, cooled, filtered, and then extracted twice with ether. The ethereal extract was washed with water, dried, and the ether removed by distillation. The residue was then taken up with a little water and tested for salicylic acid with ferric chloride, the violet coloration being produced if a mere trace of the acid was present.

The accuracy of this method was proved by applying it to some of the mother liquid from which salicin had crystallized, and also to a very dilute solution of pure salicin; in both cases well marked reactions were obtained.

In a few cases, on long standing, crystals were obtained which, however, proved to be inorganic.

The results of this examination are given in the following tables:—

In those cases in which salicin and salnigrin were isolated their identity was established by the determination of the following constants:—

*Salicin*, melted at  $200^{\circ}$  corr., gave a red colour with sulphuric acid, and in aqueous solution  $[\alpha]_D = -64.4^{\circ}$ . Beilstein gives melting-point,  $201^{\circ}$  and  $[\alpha]_D = -65^{\circ}$ .

*Salinigrin*, melted at  $193^{\circ}$  corr., gave no colour with sulphuric

## EUROPEAN WILLOWS AND POPLARS

| Species Examined                                | Source and Date of Collection | Cm U-ed | Salicin      | Reaction for |                | Remarks                          |
|-------------------------------------------------|-------------------------------|---------|--------------|--------------|----------------|----------------------------------|
|                                                 |                               |         |              | Glucoside    | Salicylic Acid |                                  |
| <i>Salix alba</i> , Linn                        | Kew March 1901                | 1 000   | nil          | trace        | trace          | salicin present                  |
| <i>S alba</i> , var <i>vitellina</i> , Linn     | Sevenoaks May, 1901           | 1 000   | nil          | nil          | nil            | —                                |
| Ditto                                           | Sevenoaks August 1901         | 200     | nil          | nil          | nil            | —                                |
| <i>S babingtonia</i> , Linn                     | Kew March, 1901               | 1 000   | nil          | trace        | nil            | —                                |
| <i>S fragilis</i> , Linn                        | Cambridge July 1901           | 1 000   | nil          | nil          | trace          | —                                |
| <i>S hippophaeifolia</i> , Thuill               | Kew, March, 1901              | 820     | nil          | trace        | trace          | salicin present                  |
| <i>S nigricans</i> , Sm                         | Kew March 1901                | 1 000   | nil          | nil          | trace          | —                                |
| <i>S pentandra</i> , Linn                       | Edinburgh May 1901            | 1 000   | nil          | nil          | trace          | —                                |
| <i>S phyllifolia</i> Linn                       | Edinburgh, August 1901        | 1 000   | nil          | well marked  | well marked    | salicin present                  |
| <i>S purpurea</i> , Linn                        | Cambridge July, 1901          | 1 000   | nil          | trace        | trace          | Ditto                            |
| <i>S rubra</i> Huds                             | Kew, March, 1901              | 1 000   | 0 1 per cent | 0 4 per cent | —              | Ditto                            |
| <i>S Russeliana</i> , Sm                        | Cambridge, August 1901        | 1 000   | nil          | nil          | nil            | —                                |
| <i>S [species ?] (narrow leaved)</i>            | Sevenoaks August 1901         | 200     | nil          | nil          | trace          | —                                |
| <i>S triandra</i> Linn                          | Cambridge August 1901         | 750     | nil          | nil          | trace          | —                                |
| <i>S viminalis</i> , Linn                       | Cambridge August 1901         | 1 000   | nil          | nil          | trace          | —                                |
| <i>S viridis</i> , Fries                        | Kew March 1901                | 1 000   | nil          | nil          | trace          | —                                |
| <i>Populus alba</i> Linn                        | Cambridge July 1901           | 1 000   | nil          | nil          | nil            | —                                |
| <i>P canescens</i> , Sm                         | Kew March 1901                | 1 000   | nil          | trace        | nil            | —                                |
| <i>P nigra</i> , Linn                           | Kew March 1901                | 1 000   | nil          | nil          | nil            | —                                |
| <i>P nigra</i> , var <i>pyramidalis</i> , Spach | Cambridge July 1901           | 1 000   | nil          | trace        | trace          | { salicin or popu<br>lin present |

## AMERICAN WILLOWS AND POPLARS.

| Species Examined.                                    | Source and Date of Collection.                      | Gm Used | Salicin or Salinigrin. | Reaction for— |                | Remarks.                          |
|------------------------------------------------------|-----------------------------------------------------|---------|------------------------|---------------|----------------|-----------------------------------|
|                                                      |                                                     |         |                        | Glucoside     | Salicylic Acid |                                   |
| <i>Salix cordata</i> , Muhl. . . . .                 | Ithaca, N.Y., Spring, 1901                          | 1,070   | ml                     | nil           | nil            | —                                 |
| <i>S. discolor</i> , Muhl. . . . .                   | Ithaca, N.Y., Spring, 1901                          | 600     | 0.2 per cent.          | 0.2 per cent. | salinigrin     | salinigrin present                |
| <i>S. longifolia</i> , Muhl. . . . .                 | St. Louis, Mo., March, 1901                         | 480     | ml                     | nil           | trace          | —                                 |
| <i>S. Missouriensis</i> , Bebb. . . . .              | Courtney, Mo., March, 1901 . . . . .                | 650     | nil                    | nil           | nil            | —                                 |
| <i>S. nigra</i> , Marsh. . . . .                     | Courtney, Mo., March, 1901 . . . . .                | 650     | ml                     | trace         | nil            | —                                 |
| <i>S. nigra</i> , Marsh. . . . .                     | Washington, D.C., May, 1902 . . . . .               | 1,000   | ml                     | —             | —              | —                                 |
| <i>S. Wardii</i> , Bebb. . . . .                     | Allenton, St. Louis Co., Mo., April, 1901 . . . . . | 570     | ml                     | trace         | nil            | —                                 |
| <i>Populus angustifolia</i> , James . . . . .        | Unknown . . . . .                                   | 490     | ml                     | nil           | nil            | —                                 |
| <i>P. balsamifera</i> , Linn. . . . .                | Ithaca, N.Y., Spring, 1901                          | 500     | ml                     | nil           | nil            | —                                 |
| <i>P. Frenonii</i> , S. Wats. . . . .                | San Bernardino ( , S. California . . . . .          | 365     | ml                     | trace         | trace          | { salicin or popu-<br>lin present |
| <i>P. grandidentata</i> , Michx. . . . .             | Ithaca, N.Y. . . . .                                | 610     | ml                     | nil           | nil            |                                   |
| <i>P. monilifera</i> , Aiton (Cotton-wood) . . . . . | Jefferson Barracks, Mo March, 1901 . . . . .        | 500     | ml                     | nil           | nil            | —                                 |
| <i>P. tremuloides</i> , Michx. . . . .               | Unknown . . . . .                                   | 485     | ml                     | nil           | nil            | —                                 |

acid, in aqueous solution  $[\alpha]_D = -85^\circ$ , and gave crystalline meta-hydroxy-benzaldehyde on hydrolysis. Previously found for salinigrin (*Journ. Chem. Soc., loc. cit.*). Melting point  $195^\circ$  corr., and  $[\alpha]_D = -87.3^\circ$ !

For the purpose of comparison it seems desirable to give here a list of the species of *Salix* and *Populus* which have been stated by previous investigators to contain salicin and those in which salicin has not been detected (cf. *Die Glykoside, loc. cit.*).

Salicin has been found in *Salix helix*, \* *S. purpurea*, \* *S. alba*, *S. Lambertina*, *S. incana*, *S. amygdalina*, *S. fissa*, *S. hastata*, *S. præcox*, \* *S. pentandra*, *S. polyandra*, \* *S. fragilis*, \* *S. Rusceliana*, *Populus tremula*, \* *P. alba*, *P. græca*, and \* *P. balsamifera*.

The following species have been examined and did not yield salicin:—\* *S. vitellina*, *S. caprea*, \* *S. viminalis*, *S. daphnoides*, \* *S. babylonica*, *S. bicolor*, \* *S. triandra*, *S. argentea*, \* *P. nigra*, \* *P. monolifera*, *P. fastigata*, *P. balsamea*, *P. virginica*, *P. angulosa*, and *P. grandiculata*.

It will thus be seen that salinigrin has been found in only one species, viz. *S. discolor*, and that it is not present in the two samples of *S. nigra* examined. Furthermore, out of thirty-three specimens examined, there were only eight which gave positive evidence of the existence of salicin or an analogous glucoside, and only in two instances were the glucosides present in sufficient quantity to be separated and identified.

As the results obtained were not in harmony with those of previous observers, it was thought that perhaps this might be due to a variation in the amount of salicin in bark collected at different seasons of the year. Accordingly, two species were collected at different seasons of the year and examined.

| Species.                         | Locality.   | And Time of Collection. |               |               |                 |               |
|----------------------------------|-------------|-------------------------|---------------|---------------|-----------------|---------------|
|                                  |             | July,<br>1901           | Oct.,<br>1901 | Jan.,<br>1902 | April,<br>1902. | July,<br>1902 |
| <i>S. purpurea</i> .             | Cambridge . | traces                  | 2.2           | 2.2           | 3.5             | 0.2 p.c.      |
| <i>S. rubra</i> <sup>1</sup> . . | Kew . . .   | 0.4                     | 3.7           | —             | —               | — p.c.        |

\* These species were examined in the present investigation.

<sup>1</sup> Unfortunately the tree at Kew was destroyed in the autumn of 1901, so that the series of experiments with this bark could not be completed.

These results prove conclusively that the amount of salicin contained in willow bark varies according to the time of its collection, hence an accurate comparison with previous determinations cannot be made, as this factor does not appear to have been previously taken into account. The determinations in the case of *S. purpurea* are, however, strictly comparable, as the bark examined in July and October, 1901, and January and April, 1902, was from the same tree (female), and that in July, 1902, from another tree (also female) of the same species from the same locality.

When the material for examination was received in April, 1902, it was noticed that it was delivered in two bundles, marked male and female respectively. The bark from the female tree was used for the first experiment, and a yield of 3.5 per cent of salicin obtained. For the purpose of repetition the bark from the male tree was examined, when, to our surprise, only 1.2 per cent. of salicin was obtained.

It was therefore arranged that the bark collected in July, 1902, should be obtained from both the male and female trees. Inquiry also showed that the bark examined previously had been obtained from the same female tree.

The results of the examination of the bark from the male and female trees may thus be tabulated —

| Season of Collection | July 1901 | Oct 1901         | Jan, 1902        | April, 1902      | July, 1902          |
|----------------------|-----------|------------------|------------------|------------------|---------------------|
| Male Tree            | —         | —                | —                | 1.2 <sup>1</sup> | 3.9 <sup>1</sup> pc |
| Female Tree          | traces    | 2.2 <sup>2</sup> | 2.2 <sup>2</sup> | 3.5 <sup>2</sup> | 0.2 <sup>2</sup> „  |

These results are remarkable and entirely unexpected, we have, therefore, carefully checked and repeated the experiments, with confirmatory results. The most remarkable fact to which we wish to draw attention is that in April the bark from the female tree contained about three times as much salicin as that from the male, whereas three months later the conditions were reversed, and the bark from the male tree contained 3.9 per cent salicin, whilst that from the female tree contained only 0.2 per cent. The results obtained with the bark of the female tree collected in July of 1901 and of 1902 are concordant, as only small amounts of salicin were obtained from two different female trees of the same species and collected on the above date in the same locality.

<sup>1</sup> Same tree (male)

<sup>2</sup> Same tree (female)

<sup>3</sup> A different tree, but same species

It is certain, therefore, that not only does the season of collection affect the amount of salicin contained in the bark, but that the bark from the male and female trees contains different amounts of salicin.

Whilst these experiments have shown that the presence of salicin in willow bark depends not only on the species examined but on the sex of the tree from which the bark is obtained and the time of the year at which it is collected, it is possible that there are other conditions not yet determined which also influence the amount of glucoside present. The cause of this variation opens up a very interesting field of inquiry, which belongs, however, more to the domain of the botanist than that of the chemist. An inquiry into the influence of these various factors on the amount of salicin contained in the bark would probably throw considerable light on the function of the glucoside in the metabolism of the plant. Whilst recognizing that further experiments on this point are desirable, we desire to make the following suggestion—that the salicin acts as a reserve food material, being stored away in the winter for use in the coming spring. The increase in the amount of salicin present in both *S. purpurea* and *S. rubra* in the autumn is thus explained. In the spring and early summer the reserve food material is drawn upon to a different extent by the male and female trees, owing to their special functions. It is possible that the glucoside is first hydrolyzed by the ferment which seems to accompany every glucoside, and that it is the glucose thus formed which is used by the plant. The glucoside thus would perform a somewhat similar function to starch.

#### SUMMARY.

The results of this investigation may thus be briefly summarised:—

1. That of the thirty-three samples of willow and poplar examined, salinigrin was only found in one, *Salix discolor*, Muhl., which may therefore be considered to be the source of salinigrin.

2. That the amount of salicin contained in the bark of a willow or poplar depends not only on the species, but on the season of the year at which it is collected, the sex of the tree, and possibly other factors.

The investigation has shown, therefore, that for practical purposes chemical assay alone can decide whether a willow bark does or does not contain salicin.

The authors were cordially thanked for their paper.

The following papers were also read in abstract in the absence of the authors :—

## CHEMISTRY OF SOLANUM DULCAMARA.

BY FREDERICK DAVIS.

In the *Pharmaceutical Journal* of October 23, 1886, it was pointed out that, as some uncertainty prevailed as to whether the fruit of *Solanum dulcamara* was poisonous, the author had made some experiments on the point, from the results of which it appeared that the fruit contained an alkaloid similar to that obtainable from belladonna. It was found that the alkaloid had the power of dilating the pupil of the eye, and it was thought that it might be intermediate in character between atropine and physostigmine. The ripe berries yielded a larger amount than those which are unripe.

Since the above note appeared I have at various times engaged myself in the further examination of this plant, operating for the most part upon fresh specimens collected upon the Surrey hills and growing, of course, upon chalk and bed of gravel. The methods employed were those indicated in Dragendorff's *Plant Analysis*.

The substances separated were: (*a*) solanine and (*b*) solanidine, two alkaloids; (*c*) solanein, a glucoside; and (*d*) dulcamarin, a bitter principle.

The solanine was removed from its salts in aqueous solution by amylic alcohol, finally crystallizing in four-sided prisms having a melting point 235°C. The taste is bitter, with subsequent burning sensation to the tongue and back of the mouth. The alkaloid gave an alkaline reaction with litmus. Solanine does not appear to be soluble in water except very sparingly; but the sulphate, hydrochloride and bimalate are freely soluble; indeed, the alkaloid exists in the ripe fruit as bimalate. The bulk of the acid of the fruit was proved to be monohydroxysuccinic acid. The percentage found in the ripe fruits in ten separate determinations varied between 0.3 and 0.7.

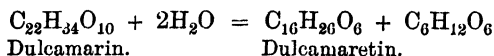
The reactions for solanine as found are as follows:—With phospho-molybdic acid it gives a canary-coloured precipitate; with potassio-bismuthic iodide, a red precipitate; with Fröhde's reagent it becomes red, then brown, and finally yellow; concentrated sulphuric acid gives a ruddy yellow colour; with alcohol and

sulphuric acid it becomes red when warmed. It does not reduce Fehling's solution.

Solanidine was found chiefly in the leaves and young shoots; but it also exists in the fruits; in fact, it would appear that solanidine is the prior alkaloidal product, and that solanine is, as it were, the ultimate product of the plant. Solanidine is soluble in alcohol, whereas solanine is practically insoluble excepting in boiling alcohol of specific gravity 0.840. The salts of solanidine are slightly soluble in water. Solanidine was removed by chloroform from an alcoholic extract of the plant. It crystallizes in brilliant acicular form, has a bitter and acrid taste, and a melting-point  $205^{\circ}\text{C}$ . Potassium, sodium, or ammonia hydroxide precipitates solanidine as a gelatinous mass.

Solanein caused some little trouble. It was found in the alcoholic extract with the solanidine, and finally remaining as a non-crystallizable body, horny in character, and of a yellow colour. Solanein is a glucoside, and has a melting-point  $208^{\circ}\text{C}$ . When boiled with very dilute hydrogen sulphate or hydrogen chloride it breaks up into solanidine and grape sugar. Solanein reduces Fehling's solution.

Dulcamarin exists throughout the plant, as evidenced by exhausting the root, stems, leaves, and fruit separately with acetic ether, then precipitating with basic lead acetate. It is at first taste intensely bitter, gradually giving place to a sweet and not unpleasant flavour, in fact, exactly the reverse to that which the name would imply. It does not answer the general tests for alkaloids, but dissolves in alkaline hydroxide with a ruddy brown coloration. Dulcamarin gives a rose pink colour with concentrated hydrogen sulphate. It is readily soluble in alcohol, and by boiling with dilute hydrogen sulphate is broken up into dulcamaretin and glucose by hydrolysis as follows:—



I find upon referring to the literature upon *Solanum dulcamara* that all authorities speak of dulcamarin and appear to consider that this bitter principle is the active agent in this plant. Some even stating it to be an alkaloid, which, however, it certainly is not, yielding none of the characteristic reactions of these bodies, neither does it form salts with dilute mineral acid; if, however, it be boiled with dilute hydrogen sulphate or hydrogen chloride grape sugar is produced, and Fehling's solution may be reduced



by the results. It is, therefore, a glucoside as well as a bitter principle.

Some diversity appears to exist respecting the formulæ of solanine. Firbas gives  $C_{52}H_{92}NO_{18}$ , whilst Hilger is of opinion  $C_{42}H_{76}NO_{15}$  represents it. Personally, I find the formula to approximate the latter, three separate workings giving by average  $C_{42}H_{76}NO_{12}$ .

Solanidine is said by Hilger to possess the formula  $C_{25}H_{14}NO_2$ , Firbas giving  $C_{40}H_{61}NO_2$ . Three separate determinations of my own yielded an average  $C_{41}H_{71}NO_2$ .

Solanein.—Firbas gives the formula of this substance as  $C_{52}H_{83}NO_{13}$ . After repeated experiments I cannot agree with this statement, this glucoside giving in my hands  $C_{48}H_{78}NO_{13}$ . In any case the glucoside contains nitrogen.

After these researches had been completed a sample of solanine was obtained from a well-known German firm, and compared with that obtained from the fresh plants. As previously indicated, it was found that in taking the melting-point, which approximated  $235^{\circ}C.$ , a sublimate occurred in acicular crystals; subsequent treatment proved these crystals to be solanidine. It seems, therefore, that commercial solanine is a mixture of solanine and solanidine.

The thanks of the meeting were accorded to the author.

## DECINORMAL AND CENTINORMAL SOLUTIONS: LIMITS OF THEIR RELIABILITY.

BY R. C. COWLEY AND J. P. CATFORD.

The facility with which volumetric titrations can be performed is sometimes apt to inspire an exaggerated idea of the accuracy of their results. Measurements such as 1/10 and even 1/20 (0.05) of a cubic centimetre are sometimes reckoned on as though absolutely correct. As this note is addressed to pharmacists chiefly, we will, by way of illustration, take the B.P. process for the alkaloidal assay of belladonna preparations. The weight of a definite volume of N/10 acid, measured from a burette, may vary several centigrammes, and even when taken from the same part of the burette the weights are not identical. When N/100 soda is run into this the variations will amount to as many tenths of a cubic centimetre, and the apparent gain in precision is invalidated.

In the case in point, an error of 50 milligrammes of N/10 acid is equivalent to about 0.0015 Gm. of alkaloid or 3 per cent. of the quantity contained in 100 c.c. of tincture.

Measurement by pipette of the N/10 solution restricts the variation to one centigramme, but only so, provided care be taken to wipe the part of the pipette that has been submerged, before adjusting to the mark, and to allow more than half a minute for draining out the liquid. If these precautions are neglected the variations would be three to five times as much. It is scarcely likely, however, that the 10 c.c. pipette would be used for standardizing the N/100 solution, as it would involve filling the burette with the weaker solution at least a second time; hence weighing the acid has every advantage, and very little can be gainsaid on the score of time.

The N/100 solution would, if weighed, be labelled, for example (1.0 c.c. = 0.098 Gm. N/10 HCl., at 24°C.).

The unreliability of comparing by volume volumetric solutions of different strengths is shown by the following examples:—

N/10 acid from pipette weighed (with the precautions mentioned) as follows:—

|                 |   |   |   |   |           |
|-----------------|---|---|---|---|-----------|
| 10 c.c. weighed | . | . | . | . | 9.991 Gm. |
| 10 c.c. weighed | . | . | . | . | 9.994 "   |
| 10 c.c. weighed | . | . | . | . | 9.996 "   |
| 10 c.c. weighed | . | . | . | . | 9.997 "   |
| 10 c.c. weighed | . | . | . | . | 9.999 "   |

From burette—

|                    |                        |                                                                 |   |                           |           |                            |
|--------------------|------------------------|-----------------------------------------------------------------|---|---------------------------|-----------|----------------------------|
| No.<br>Calibrated. | Burette<br>Calibrated. | 10 c.c. weighed 9.991 Gm. and neutralized 101.7 c.c. N/100 NaOH |   |                           |           | Burette not<br>Calibrated. |
|                    |                        | 4 c.c.                                                          | " | 3.965 Gm. and neutralized | 40.4 c.c. |                            |
|                    |                        | 1 c.c.                                                          | " | 4.006 Gm. and neutralized | 40.8 c.c. |                            |
|                    |                        | 4 c.c.                                                          | " | 4.016 Gm. and neutralized | 41.0 c.c. |                            |
|                    |                        | 4 c.c.                                                          | " | 4.022 Gm. and neutralized | 41.1 c.c. |                            |
|                    |                        | 4 c.c.                                                          | " | 3.964 Gm. and neutralized | 40.1 c.c. |                            |
|                    |                        | 1 c.c.                                                          | " | 3.979 Gm. and neutralized | 40.1 c.c. |                            |
|                    |                        | 4 c.c.                                                          | " | 3.990 Gm. and neutralized | 40.2 c.c. |                            |
|                    |                        | 4 c.c.                                                          | " | 3.995 Gm. and neutralized | 40.4 c.c. |                            |
|                    |                        | 1 c.c.                                                          | " | 4.005 Gm. and neutralized | 40.4 c.c. |                            |

In the comparative trials quoted above tincture of cochineal was used as the indicator, but the B.P. tincture was diluted with 9 vols. of 45 per cent. alcohol, so that a measured quantity (1.0 c.c.) could be used each time. To ensure the same tint a blank standard of the tincture with water only was employed. In other trials, not quoted, methyl orange was used, 3.0 c.c. of B.P.

solution diluted to 100 c.c. (1.0 c.c. = m.  $\frac{1}{2}$ ). The variations were quite as great.

The authors were thanked for the above paper.

In the absence of the author abstracts of the following papers were read by Mr. Ransom:—

### AN IMPROVED FORM FOR LIQUOR BROMO-CHLORAL COMPOSITUS.

BY R. WRIGHT, F.C.S.,

*Pharmaceutical Chemist.*

When Liquor Bromo-Chloral Compositus was introduced into the Conference Formulary several medical men in my locality took it up, but I think that all of them dropped it after a short experience of its use. The chief objections urged against it were (1) its excessive acidity, (2) its uncertain effect, and (3) the large dose required in comparison with those of other preparations of the kind.

As there is a considerable demand for a compound of this description a few experiments were made with a view of producing a preparation which should be free from the above drawbacks and yet retain the essential characters of the type.

The U.S. National Formulary has a similar preparation, under the title of *Mistura Choral et Potassii Bromidi Composita*, containing in each fluid drachm 15 grains each of chloral and bromide and  $\frac{1}{2}$  grain each of extract of Indian hemp and extract of hyoscyamus.

Comparing the two forms, it would appear that the latter preparation contains 5 grains more of chloral and bromide in each fluid drachm, and about 10 per cent. more of extract of Indian hemp. The proportion of hyoscyamus alkaloids will be greater in the British preparation, but the amount present is so small that it could not appreciably affect the character of the preparation.

Thus an alcoholic extract of hyoscyamus like that of the U.S.P. contains approximately  $\frac{1}{400}$ th its weight of alkaloid,<sup>1</sup> so that each fluid drachm of the American preparation would contain about  $\frac{1}{3,200}$ th grain alkaloid.

The succus hyoscyami of the British Pharmacopœia yields on an average 0.005 per cent. alkaloid,<sup>2</sup> so that each 10 minims

<sup>1</sup> Vide *Pharm. Journ.* [4], **5**, 517.

<sup>2</sup> *Year-Book of Pharmacy*, 1896, p. 212.

(=1 fluid drachm liquor bromo-chloral co.) would contain approximately  $1/2,200$ th grain alkaloid.

The following are the alterations which I suggest should be made in the Formulary preparation:—

1. Increase the amount of chloral and bromide to 15 grains each in each fluid drachm, and substitute sodium for potassium bromide.

2. Omit the filtration, which takes out the resins of the Indian hemp. Add a little mucilage to suspend the resins and retain them.

3. Delete the henbane juice, and substitute hyoscyne hydrobromide in the proportion of  $1/400$ th grain in each fluid drachm.

4. Increase the quantity of liquid extract of liquorice to mask the taste of the chloral and bromide, and minimize the acidity. The latter is due to the Indian hemp, and cannot altogether be overcome.

The following form is drawn on the above lines:

Take of :

|                                              |                      |
|----------------------------------------------|----------------------|
| Chloral hydrate . . . .                      | 2,400 grains. •      |
| Sodium bromide . . . .                       | 2,400 „              |
| Tincture of Indian hemp . .                  | 440 minims.          |
| Hyoscyne hydrobromide . . .                  | $\frac{1}{2}$ grain. |
| (= solution 1 per 1,000, 440 minims)         |                      |
| Syrup of orange . . . .                      | 4 fl. ounces.        |
| Mucilage of acacia . . . .                   | 1 fl. ounce.         |
| Liquid extract of liquorice . .              | 2 fl. ounces.        |
| Distilled water sufficient to make one pint. |                      |

Place the chloral hydrate and sodium bromide in a mortar, add  $6\frac{1}{2}$  ounces distilled water, the syrup of orange, and solution of hyoscyne hydrobromide; triturate till solution is complete; add the mucilage of acacia, and gradually the tincture of Indian hemp. Then add the liquid extract of liquorice, and adjust the volume to one pint by means of distilled water. If necessary, strain through tow.

Each fluid drachm contains 15 grains each of chloral hydrate and sodium bromide,  $\frac{1}{2}$  grain extract of Indian hemp and  $1/400$ th hyoscyne hydrobromide.

This preparation, under the name of Liquor Bromidi Compositus, has been in use in my dispensary for several years past, and has given general satisfaction to those medical men who have prescribed it.

## CAMPHORATED OIL OR LINIMENT OF CAMPHOR.

BY R. WRIGHT, F.C.S.,

*Pharmaceutical Chemist.*

The number of prosecutions for the sale of camphorated oil deficient in camphor goes to show that many chemists do not find it an easy matter to obey the official injunction to "dissolve the camphor in the olive oil." In the *Pharmaceutical Journal* for July 26 a case of this kind is reported, in which the defence set up was to the effect that the preparation had been made so recently that the camphor had not had time to become completely dissolved.

It should not be forgotten that the linimentum camphoræ of the British Pharmacopœia is a saturated solution of camphor in olive oil, and that in the cold, solution takes place so slowly that, unless the camphor be in an extremely fine state of division, the process may take two or three weeks to complete.

If the proportion of camphor be increased by 25 per cent. some of it will crystallize out in very cold weather.

The process of solution of the camphor in the oil may be expedited either by the employment of heat, or by the addition of a liquid in which camphor is more soluble and which is miscible with the oil. Frequent agitation also assists solution very appreciably. If heat is employed, it is important that the oil be not freely exposed to the air during the process. The rapidity with which volatilization of the camphor may take place is well illustrated by the following experiment. Two fluid ounces of camphorated oil were introduced into a dry pint flask, and a thermometer inserted through the open mouth of the flask, so that the bulb was immersed in the oil. The flask was then placed on a water-bath, the bottom dipping into the water, and heat was applied to the bath. The temperature of the oil was 59°F. Sublimation of camphor commenced at 85°F. In five minutes the thermometer registered 91°F., and a dense crystalline deposit had begun to form inside the flask above the level of the liquid.

The temperature gradually rose to 100°F., and was maintained at this point for half an hour. At the end of that time the whole of the exposed surface of the flask was covered with a sublimate of camphor in crystalline plates. Heat was again applied, and the temperature raised to 160°F., at which point it was maintained for two hours. The flask was then removed from the water-bath,

and the amount of the sublimed camphor roughly estimated in the following manner:—

The thermometer was withdrawn, and the oil carefully drawn off with a pipette, the last traces being removed by means of a mop of absorbent wool fixed on the end of a stirring rod. The weight of the flask was then taken, the camphor dissolved out by means of absolute ether, and the flask again weighed. The difference between the two weighings was 32 grains. On allowing the ethereal solution to evaporate spontaneously a residue, not quite dry, was left, weighing 35 grains.

The oil originally taken contained 175 grains camphor; the loss in this experiment was therefore about 18 per cent. of the whole.

The residual oil was now returned to the flask, the temperature raised rapidly to 180°F. as before, and maintained thereat for an hour. The oil was then abstracted, and the loss of camphor determined as before.

The loss by difference was 21 grains (from ethereal solution 20 grains), or practically 15 per cent. of the remainder.

An experiment like this shows very clearly that if heat be used in the preparation of camphorated oil great care must be taken to prevent the escape of camphor by volatilisation.

The following method has in my hands proved the most satisfactory with the least trouble:

Take of:

|                    |           |                |
|--------------------|-----------|----------------|
| Camphor in flowers | . . .     | 4 ounces.      |
| Olive oil          | . . . . . | 16 fl. ounces. |

Place the camphor in a dry bottle, add the oil, previously heated to 160°F. (71°C.), shake frequently till solution is effected. Working in this way, the camphor dissolves quickly, and the process is completed in from one to two hours.

The same result might doubtless be effected by the aid of solvents. Thus 4 ounces of flowers of camphor will readily dissolve in 1½ fluid ounces chloroform, and this solution is miscible with olive oil in all proportions. The addition of a much smaller portion of chloroform is, however, sufficient to induce very rapid solution of the camphor in the oil. If, for example, a fluid drachm of chloroform be added for each ounce of camphor, the solution of the latter can easily be effected in the cold in half an hour, if the mixture is shaken occasionally.

## ALCOHOLIC EXTRACTS.

By R. WRIGHT, F.C.S.,

*Pharmaceutical Chemist.*

In a note on some of the official extracts, contributed to an evening meeting of the Pharmaceutical Society by Mr. Farr and myself (*Pharm. Journ.* [4], 5, 517), we drew attention to the advantages possessed by extracts prepared from dried drugs by treatment with alcohol and subsequent evaporation of the tincture, more particularly as substitutes for the "juice" extracts.

We also gave the average yield per pound of the dried drug, and the amount of alkaloid contained in the finished product. Among the extracts referred to were aconite (leaf and root), belladonna leaf, conium (leaf and fruit), colchicum (root and seed), hyoscyamus leaf, and stramonium (leaf and seed). The above extracts were prepared from a tincture made up with 70 per cent. alcohol, except colchicum, for which a 50 per cent. menstruum was employed.

It occurred to me that it might be worth while to supplement the work already done on the subject by preparing a second batch of extracts with menstrua of other strengths, weaker in the case of the leaf extracts and stronger in the case of colchicum. This was carried out, and I am now able to record some of the results, and to show them alongside those to which reference has already been made. The following table shows the alcoholic strength of menstruum used, the alkaloidal strength of the extracts, and the approximate yield per pound of the dried drug:—

| Extract.          | Menstruum         | Yield per lb   | Alkaloid.         |
|-------------------|-------------------|----------------|-------------------|
| Aconite Leaf . .  | 1897=70 per cent. | 2½ oz.         | 0.60              |
| Aconite Root . .  | 1897=70 per cent. | 4 oz.          | 2.44              |
| Ditto . . . .     | 1902=45 per cent. | 5 oz. soft     | 1.22              |
| Belladonna Leaf . | 1897=70 per cent. | 4 oz.          | 2.86              |
| Ditto . . . .     | 1902=45 per cent. | 4 oz.          | 2.00 {1165        |
| Conium Fruit . .  | 1897=70 per cent. | not calculated | 8.13 hydrochloro- |
| Ditto . . . .     | 1902=45 per cent. | 2¼ oz. soft    | 7.00 ditto        |
| Colchicum Root .  | 1897=50 per cent. | 2¼ oz.         | 1.67              |
| Ditto . . . .     | 1902=70 per cent. | not calculated | 2.10              |
| Colchicum Seed .  | 1897=50 per cent. | 2 oz.          | 3.16              |
| Ditto . . . .     | 1902=70 per cent. | 3½ oz.         | 4.00              |
| Hyoscyamus Leaf   | 1897=70 per cent. | 4 oz.          | 0.80              |
| Ditto . . . .     | 1902=50 per cent. | 6¼ oz.         | 0.25              |
| Stramonium Leaf   | 1897=70 per cent. | 2 oz.          | 1.54              |
| Stramonium Seed   | 1897=70 per cent. | not taken      | 2.78              |

A number of observations have been made on the keeping properties, etc., of the extracts, but as further work is in progress these are for the present withheld. I think, however, that the time has arrived when the question of the introduction of some extracts of this class into the Imperial Pharmacopœia will have to be faced, and in connexion therewith an attempt should be made to work out a scheme for the standardization of those which admit of such a form of treatment.

Some of the necessary work in connexion with a project of this description has already been done, and many of the facts and figures needed are available, but much more will have to be done before any official treatment of the subject on a systematic basis can be attempted.

As to the lines upon which the necessary investigation should proceed, two general principles only need to be laid down—(1) the treatment of each drug by the selective method, and (2) a separate and distinct process for every individual preparation.

One of the most difficult questions to be settled lies in the fixing of standards, and the greatest care needs to be taken to ensure that the standards laid down shall not be so high as to exclude any preparation carefully made from a drug of average quality. On the other hand, still greater care is requisite to ensure that the opposite condition is not allowed to obtain, by fixing the standards sufficiently high to prevent the foisting upon British pharmacists of worthless preparations made from the waste and spoilt drugs of other countries.

It is more with a view of eliciting information, and opening out a discussion upon the subject, than for any other reason that I draw the attention of the members of the Conference to two lists of standards for alcoholic extracts which have come into my hands. The first, by C. H. La Wall, is taken from a paper read at a meeting of the Pennsylvania Pharmaceutical Association (*vide Pharm. Journ.* [4], 3, 161). The second has been supplied to me by a well-known firm of manufacturers, and represents the standards to which they work in the production of the extracts in question.



| Extract.                  | Percentage of Alkaloid. |                     |
|---------------------------|-------------------------|---------------------|
|                           | La Wall.                | Manufacturers.      |
| Aconite Root . . . . .    | 2.50                    | test, physiological |
| Belladonna Leaf . . . . . | 2.00                    | 1.75                |
| Conium Fruit . . . . .    | 1.75                    | 2.50                |
| Colchicum Root . . . . .  | 2.00                    | 2.50                |
| Colchicum Seed . . . . .  | none                    | 2.50                |
| Hyoscyamus Leaf . . . . . | 0.90                    | 0.50                |
| Stramonium Leaf . . . . . | none                    | 1.50                |
| Stramonium Seed . . . . . | 1.75                    | 1.50                |

Comparing the above standards with the figures shown in the first table, it will be seen that, with one or two exceptions, they appear to be reasonable and practicable. I think that in the one or two cases, however, they will need modification for extracts made from English-grown drugs. Conium is a case in point, where a 5 per cent. standard for alkaloids would be quite practicable.

The most difficult case is that of hyoscyamus. La Wall's standard of 0.9 per cent. is much too high for a preparation of the British plant, and I think that even 0.5 per cent. will be found too high. But these prognostications are, to a very great extent, speculative, seeing that the alkaloidal strength of an alcoholic extract is determined very largely by the alcoholic strength of the menstruum employed for the extraction of the drug, and to a certain extent also by the degree of exhaustion which is effected.

The author was cordially thanked for the above contributions.

## THE VOLUMETRIC DETERMINATION OF LEAD SALTS.

BY R. C. COWLEY AND J. P. CATFORD.

The published volumetric processes are admittedly less accurate than gravimetric processes. The inaccuracy is further increased by the difficulty in perceiving the end of the reaction when titrated directly with either sulphuric or oxalic acid. Other methods are still more troublesome. Hempel's method does not give satisfactory results owing to several causes, especially the following:—

- (1) Measuring normal solution of oxalic acid impairs the precision

of the decinormal permanganate reading, because the possible error of 0.05 c.c. of the normal solution becomes an error of 0.5 c.c. of the decinormal, or more than 0.005 Gm. of metallic lead.

2. We find it still more erroneous to base the calculation of the lead on the determination of the excess of oxalic acid by titrating a portion of the solution.

Direct titration of the precipitated lead oxalate is perfectly satisfactory and simple. The lead is precipitated by N/10 oxalic acid, in excess, transferred to a filter, washed and titrated direct with permanganate and sulphuric acid. There is no necessity for dissolving in nitric acid and sodium acetate; in fact, the addition of alkali, either then or in the first part of the operation, is the reverse of advantageous. If the precipitation is performed without heat, the filtrate plus the washings can be used to determine the quantity of acid in the lead compound—an important point, in Goulard's extract, for example, to prove that the acetate is completely converted into the basic compound, which the B.P. test does not do. Owing to the difficulty in obtaining N/10 sodium hydrate quite free from carbonate, we prefer to use baryta, or lime water, standardized against the oxalic acid at the time of using.

A good indicator for acetic acid in the presence of  $\text{CO}_2$  is still a desideratum. It would be interesting, by the way, to know to what extent the conflicting results recently obtained in experiments with oil of turpentine and "glacial" acetic acid may be due to small errors in determining the strength of the acetic acid, owing to the presence of a little carbonate in the caustic soda.

If permanganate would correctly determine the excess of oxalic acid in the filtrate, it could be used after finding the total acidity, but we have repeatedly found the permanganate required for the filtrate to exceed the difference between that required by the precipitate and the total oxalic acid used, showing that the liberated acid radical is not without action on the permanganate, hence the fallacy of basing the assay on estimation of the residual oxalic acid.

The filtrate from the lead oxalate does not show the slightest indication of lead after passing  $\text{H}_2\text{S}$  through it for half an hour, even in the case of lead nitrate; but when sulphuric acid was the precipitating agent there was a discoloration.

The proportion of lead compound to be weighed should be somewhat less than the following equivalents ( $\text{O} = 16.0$ — $\text{Pb} = 206.4$ ):—

| N/10 Oxalic Acid or Permanganate = Pb. | Nitrate.    |             | Subacetate.                     |
|----------------------------------------|-------------|-------------|---------------------------------|
| 1.0 c.c. = 0.01032 Gm.                 | 0.01652 Gm. | 0.01892 Gm. | 0.01367 Gm.                     |
| 20.0 c.c. = 0.2064 Gm.                 | 0.3304 Gm.  | 0.3784 Gm.  | 0.2734 Gm.                      |
| 25.0 c.c. = 0.258 Gm.                  | 0.413 Gm.   | 0.473 Gm.   | { 1.47 Gm.<br>Liquor Ft. P.B. } |

| N/10 Oxalic Acid or Permanganate = Pb. | N/10 NaOH = NO <sub>3</sub> | C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> . |
|----------------------------------------|-----------------------------|------------------------------------------------|
| 1.0 c.c. = 0.01032 Gm.                 | 1.0 c.c. = 0.0062 Gm.       | 0.0059 Gm.                                     |
| 20.0 c.c. = 0.2064 Gm.                 | —                           | —                                              |
| 25.0 c.c. = 0.258 Gm.                  | —                           | —                                              |

**Examples :—**

Pb(NO<sub>3</sub>)<sub>2</sub> 0.413 + 30.0 c.c. N/10 oxalic acid.

Precipitate = N/10 permang. 25.0 c.c. (× 0.01032 = 0.258 Pb).

5.0 c.c. excess of oxalic acid.

Filtrate = N/10 NaOH 30.0 c.c.

— 5.0 c.c.

25.0 c.c. (× 0.0062 = 0.155 NO<sub>3</sub>).

Freshly crystallized plumbic acetate 0.4 Gm. + 25.0 c.c. N/10 oxalic acid.

Precipitate = permang. 21.2 c.c. 21.2 × 0.01892 = 0.1011 (excess 0.0011).

Filtrate = N/10 oxalic 24.0 c.c. (— 3.8 = 20.2 × 0.0059 = 0.119 C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>).

The salt had effloresced slightly in drying, losing apparently a little acetic acid, which would be to some extent replaced by carbonic acid.

In assaying neutral salts the volume of NaOH should equal that of total oxalic acid. In assaying subacetate the volume of NaOH corresponding to the acetic acid should be half that of permanganate.

**Example:** Sample of liquor plumbi subacetatis; sp. gr. 1.313 (at 20°C.).

1.3 Gm. + 25.0 c.c. N/10 oxalic. Precipitate = permang. 24.6 c.c.

(× 0.01032 = 0.25387 Pb).

Filtrate = 12.5 c.c. N/10 NaOH 12.5 — 0.4 = 12.1.

(× 0.0059 = 0.07189 C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>).

and Subacetate 0.01367 × 24.6 = 0.33628 in 1.3 Gm. = 25.87 per cent.

Sp. gr. 1.313.

B.P. = 28.24 per cent. Sp. gr. 1.275

Goulard's extract is a preparation whose strength is probably never adjusted by assay, but as long as the Pharmacopœia gives a process it may as well be the best way. N/20 solutions gave results somewhat closer to the calculated quantities, but the above appear sufficiently near for pharmaceutical requirements.

The authors were cordially thanked for the above paper.

## THE VOLUMETRIC DETERMINATION OF SODIUM PHOSPHATE AND SODIUM ARSENATE.

BY F. R. DUDDERIDGE, F.C.S., AND J. S. HILL.

The British Pharmacopœia, 1898, gives no quantitative test for sodium phosphate, except to state that when "heated to dull redness it loses 62.84 per cent. of its weight," which corresponds to a purity of 100 per cent. of  $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$ . For sodium arsenate it inserts a volumetric process using lead acetate, which is generally considered to be unsatisfactory. The U.S. Pharmacopœia determines the acidity of phosphoric acid by neutralizing it with alkali in the presence of phenol-phthalein, neutralization taking place when two-thirds of the hydrogen has been displaced. Squire also refers to this process, and the authors of this note have found it to work satisfactorily. If methyl-orange be substituted for phenol-phthalein, neutralization occurs when one hydrogen atom has been replaced, and cochineal behaves similarly to methyl-orange, as might have been expected. We consider that this process might be substituted with advantage for the present official gravimetric method for concentrated phosphoric acid, in which lead oxide is used.

It will be seen, then, that sodium phosphate is neutral to phenol-phthalein, but alkaline to methyl-orange. We therefore determined to try whether by neutralizing it with volumetric sulphuric acid in presence of methyl-orange, according to the equation  $(2\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O} + \text{H}_2\text{SO}_4 = 2\text{NaH}_2\text{PO}_4 + \text{Na}_2\text{SO}_4 + 24\text{H}_2\text{O})$ , accurate results could be obtained. These results were checked by determination of loss of water at dull redness as directed in the B.P., and also by gravimetric determination of the phosphoric acid by means of magnesia mixture and weighing it as magnesium pyrophosphate in the usual manner, three determinations being made in each process. The sample of sodium phosphate was taken from a newly procured bottle labelled "Pure

Sodium Phosphate." The simplicity of the method and the uniformity of the results are shown in the subjoined table:—

|                                                                                                                                                            | Found<br>Per Cent.                  | Calculated.<br>Per Cent. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------|
| (a) Loss of water on heating<br>to dull redness . . .                                                                                                      | (1) 62.77<br>(2) 62.86<br>(3) 62.70 | 62.84                    |
| (b) Determination of $\text{PO}_4$ as<br>$\text{Mg}_2\text{P}_2\text{O}_7$ , and calculated<br>to $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$ . . | (1) 98.26<br>(2) 97.20<br>(3) 99.46 | 100                      |
| (c) Determination volumetri-<br>cally, using $\text{N}/\text{O}$ $\text{H}_2\text{SO}_4$<br>in presence of methyl-<br>orange . . . . .                     | (1) 99.75<br>(2) 99.84<br>(3) 99.15 | 100                      |

Owing to the high molecular weight of the salt, it is necessary to take a rather large quantity for analysis, as we find that the end-reaction, although quite distinct if normal  $\text{H}_2\text{SO}_4$  be used, is less characteristic with a weaker acid. Not less than 3 Gm. should be taken therefore, and the solution made fairly strong.

We have also applied the process to the determination of sodium arsenate, using freshly recrystallized salt, with equally good results. For this substance we must emphasize the necessity for using quite 3 Gm. of the crystallized salt or its equivalent of the anhydrous, in fairly strong solution for each determination, as the end-reaction is less sharp than in the case of the phosphate. This we find to interfere with its use for the determination of the official "liquor sodii arsenatis," a series of experiments made with decinormal acid giving too vague end-reactions to be of any service. We have also made experiments to determine the amount of phosphate in ferri phosphas, B.P., and of arsenate in ferri arsenas, B.P., by boiling a weighed quantity with excess of volumetric sodium hydroxide, diluting to a given volume, filtering off an aliquot part, neutralizing in presence of phenol-phthalein, then adding methyl-orange and titrating with normal sulphuric acid until neutral, but none of these experiments yielded satisfactory results.

We are of opinion, however, that the process is perfectly applicable in the case of solid sodium phosphate and sodium arsenate, and that its introduction would be a great improvement upon the present process in the case of the latter salt, the instability of

which as regards the quantity of its water of crystallization is such a source of trouble to pharmacists, and calls for a readily applicable method for its determination.

In conclusion, we may note the presence of a large quantity of sodium sulphate in a sample of dried sodium phosphate, which we examined a few months ago.

The authors were cordially thanked for the above contribution, which concluded the papers.

### GENERAL BUSINESS.

PRESENTATION TO MR. W. A. H. NAYLOR, F.I.C., F.C.S.,  
*Late Honorary Secretary of the British Pharmaceutical  
Conference.*

The PRESIDENT next referred to the onerous and delicate duties which fell to the lot of a Secretary of the Conference. They had been blessed in their Secretaries. In succession he spoke of the services successively rendered by Dr. Attfield and by Mr. Naylor, whose retirement during his presidency he looked on as a blow the stress of which it was difficult to estimate. Though he was no longer their Secretary, they felt, and a large number of members felt, that they should show in some small degree how much they appreciated his services. A large number of responsible men had sent in subscriptions. They had limited the amount, wishing to make it a tax on nobody. If they had left it an open question the amount subscribed would have been very much larger. No fewer than 230 members and friends had subscribed to the testimonial which he was about to place in Mr. Naylor's hands. Accompanying those subscriptions hundreds of letters had been received conveying the hearty wishes and congratulations of the donors. In an illuminated address were contained the names of those donors, and, in addition to that, a writing-desk and four water-colour pictures comprised their gift to one who was so worthy of honour. Those marks of their esteem, he trusted, would afford to Mr. Naylor a lasting reminiscence of their kindly feelings and a memento of the many friends he had made in various parts of the British Isles. The President then, in graceful terms, asked Mr. Naylor to accept the gifts subscribed for by so many sincere friends.

Mr. ATKINS said : It is a great pleasure for me to be allowed to

take part in conferring this graceful and fitting compliment. I heartily congratulate Mr. Naylor on the fact that so large a gathering and so large a number of ladies are here. When I first heard that Mr. Naylor was obliged to retire I had an idea that we had better close the Conference. That, of course, was a mistaken impression, because there are excellent secretaries existing, but I do wish to express my deep debt of gratitude to Mr. Naylor, and my great admiration for his character. When I say that I believe it would be possible for Mr. Naylor to take rough, raw, and unfitting material and mould it into a permanent official, leading him through his term of office as President, I offer myself as a living example of his wonderful power. He has, first of all, an intimate, accurate, and sound acquaintance with the science with which we deal. He also has a knowledge of human nature, and he knows how to deal with us angular beings who require to be treated with great consideration. To use a hackneyed phrase, he knows how to combine the *suaviter in modo* with the *fortiter in re*, and sometimes the *fortiter in re* was wisely shown and administered, and I think we were all the happier and the better for it. The *Year-Book* will long enshrine the work which Mr. Naylor accomplished, and it will be an abiding record of his great power and character. It is well that he should have in his home, in his family life, some indication of the esteem in which we hold him. I am glad the response to this testimonial has been so widely met, and that you have handed to him the record and the other portions of our gift, and doubly glad to think that in his home life there will always be afforded evidence of our great esteem.

Mr. MARTIN also paid a eulogy to Mr. Naylor's talents and character, and referred in terms of warmest commendation to the services of Mr. Ransom, the present senior Secretary of the Conference.

Mr. NAYLOR, on rising to reply, said: Mr. President, ladies and gentlemen, and members of the British Pharmaceutical Conference—By your magnificent gift to-day, I feel that you have placed me under a debt of obligation which I can never repay. The all too flattering comments and kindly sentiments with which you have accompanied this gift have added immensely to my embarrassment in acknowledging it. When I reflect that this most generous tribute to the comparatively small service which I have rendered the Conference comes—shall I say?—as the crowning act of a long series of indulgences and kindnesses manifold, my heart is stirred to its utmost depths. Oppressed as I am by the consciousness of

my utter inability at this moment to express the gratitude I feel, I can only find relief in the simplest and homeliest language. Will you please, one and all who have subscribed so liberally to this testimonial, accept my sincere and heartfelt thanks for your valuable gift, and not less for the never-to-be-forgotten good wishes with which you have accompanied it? I am also grateful to you for having afforded me an opportunity of selecting the articles for personal use and domestic adornment, and I am sure you will be gratified to know that they are according to the taste and need of my wife and myself, and that we are more than satisfied with the selections that have been made. I do not know whether you will pardon one personal remark—that while the paintings will give grace and charm to the home they will be to my wife especially, and by reason of her disability as cut off from the world of sound, in a large measure a compensating and lasting pleasure. And now, as a farewell word ere I retire from official life into the ranks, I should like to say what a great advantage it has been to me to have been officially connected for so considerable a time with the Conference. It has opened up to me a field of usefulness and opportunity which many a young man more gifted than myself would have gladly embraced. Experience of the duties of the Secretaryship in happy and long association with my friend Mr. Ransom has been an education to me of a kind that will prove of life-long service. It has also brought to me the inestimable privilege of intimate association with men of light and leading in our ranks, and into fuller fellowship with the members of the British Pharmaceutical Conference who are accustomed to foregather at these annual meetings. And now I am afraid I have overlooked what has been put in my hands, but I can assure you I shall very highly prize this beautifully illustrated album with the *facsimile* signatures of the subscribers. I have just one word of regret. It is this—that the gifts could not have very well been brought to this distance, and so they cannot be on exhibition, but I assure you if it is a matter of convenience when any of you are in London, it would give my wife and myself very great pleasure to show them should you kindly favour us with a visit.

*Presentation from the Bell and Hills Fund.*

The PRESIDENT then presented nine volumes of books to the Forfarshire and District Chemists' Association, the annual dona-



tion from this fund. The gift was accepted on behalf of the Association, by Mr. WM. CUMMINGS, in a terse speech.

The books were : Squire's *London Hospitals Pharmacopæias*, *Companion to the B.P.*, Strassburger's *Practical Botany* Greenish's *Materia Medica*, White and Humphrey's *Pharmacopædia*, Caspari's *Pharmacy*, Quain's *Dictionary of Medicine*, *United States Dispensatory*, Tuson's *Veterinary Pharmacopæia*.

### *The Formulary Committee.*

Mr. S. R. ATKINS proposed that Messrs. N. H. Martin, A. C. Abraham, W. A. H. Naylor, F. C. J. Bird, Peter Boa, C. Symes, F. Ransom, W. F. Wells, J. C. Umney, Harold Wilson, R. Wright, and Harry Wilson be appointed the Formulary Committee. He alluded to the fact that Mr. J. C. Umney was appointed to fill the place rendered vacant by the death of that estimable pharmacist, Mr. William Martindale, and he added a few graceful encomiums on his departed friend.

The proposition was seconded by Mr. THEO. H. WARDLEWORTH, who pointed out the importance of the work done by the Committee, and the fact that, of the 2,000 copies of the last B.P.C. Formulary, 1,500 copies had already been sold.

The proposition was unanimously adopted, subject to the consent of Dr. Symes, Messrs. A. C. Abraham, Harold Wilson, R. Wright and Harry Wilson, who were absent.

### *Place of Meeting for 1903.*

Mr. J. W. WHITE (Clifton), on behalf of the pharmacutists of Bristol and Clifton, invited the members of the Conference to Bristol next year. It was about thirty years since the Conference visited Bristol, and during that long interval its natural beauties had not diminished. In one respect they would be somewhat at a loss. Some of their older and more illustrious brethren had passed away. There would be no Schacht, or Stoddart, or Giles to extend the right hand of fellowship and shed a local lustre on their deliberations, but the existing members would do their best to give the Conference a hearty welcome.

Mr. E. F. YOUNG (Bristol) cordially supported Mr. White's invitation. He thought they would find in Bristol much of great

interest. Members would be able to spend a most delightful holiday. Bristol, he judged, had suffered in the past from undue modesty. An opinion appeared to be prevalent that Bristol was existing in the light of a historic past. It had been suggested to him the other day that "Bristol had had its day." Perhaps it had not increased at the phenomenal rate of other more mushroom towns. Since the first dock was cut in Bristol in 1267 the town had shown a steady increase, and in 1903 the Conference would doubtless find they had made very considerable progress in modernity. It had been reported that certain pessimistic Scotch prophets had predicted that the Conference was to be buried in Dundee. All he (the speaker) could say was that the funeral had been a very enjoyable one, and he trusted that next year the resurrection would be as pleasant.

Mr. TURNER (Bristol) also added his word to that of previous speakers. He reminded the meeting that the distance between Bristol and Dundee was the same as that between Dundee and Bristol. He trusted that those advanced educationists of Scotland, from whom they had heard so much that day, would come and illumine some of the dark places of Bristol. He could assure them a hearty reception.

Mr. H. E. BOORNE also dilated on the beauties and wonders of Bristol and district, and assured the meeting of a cordial welcome.

Mr. WELLS said he rose with very great pleasure to propose that the meeting cordially accept the invitation to Bristol. He thought it would be most appropriate that as they met in Ireland last year, and in Scotland on this occasion, where they had received such a hearty welcome, that they should meet next year in England. Of course it was well known, even in ancient days, that Scotland always gave a warm welcome to invaders, even if it was with cold steel. They had heard so many things of Bristol that he felt sure if they accepted the invitation, they would get a hearty reception there. Some few years ago it had been prophesied that the Conference was going to collapse. After the Conferences of Dublin and Dundee they need have no fear of that, and those who prophesied collapse ought to have waited until they knew.

Mr. JAMES RUSSELL (Dundee) seconded the motion. If they went to Bristol, he said, it would help to keep up the reputation of the Conference to show that they had been well treated in Dundee, and that they expected also to have similar treatment in Bristol.

The PRESIDENT, in putting the motion to the meeting, said Bristol was known to everybody as being the home of two or three of their most illustrious pharmacists. It was the city in England that he liked best after his own, and he knew that the hospitality they would receive, combined with the charms of the beautiful scenery around it, would greatly contribute to the success of the Conference.

The motion was unanimously and very heartily agreed to.

Mr. NEWSHOLME asked permission to give a hint that after the Conference in Bristol, Sheffield would like to be honoured by a visit from the Conference in 1904. He hoped to be present next year, when he would speak of the glowing beauties of Sheffield. It was said to be smoky, but the same had been said of Dundee, and they had not found it so, and they would find Sheffield not so black as it was painted. Some one had spoken of it as "hell with heaven drawing its arms around it," and while it was not deserving of the first description, certainly there was an extremely charming country round about it.

#### *Alteration of Rule V.*

The PRESIDENT moved that the words "four vice-presidents" in Rule V. should be altered to "a number of Vice-Presidents not exceeding six." There were obvious reasons for this, and the Executive Committee recommended the alteration.

Mr. UMNEY formally seconded, and the alteration was approved.

#### *Election of Officers for 1902-3.*

The PRESIDENT, in moving the election of officers for 1902-3, took occasion to refer particularly to his proposed successor in the chair. The committee had selected for their approval a name which he thought would commend itself to the Conference. Whatever the gentleman whom he would name touched had turned to gold; in connection with pharmacy he had written a book on *Essential Oils*, which had enhanced his reputation in that respect; and he (Mr. Druce) was sure he would bring to bear on the Conference proceedings all the business knowledge and capability of which he was the possessor. He was sure they would have pleasure in approving of the nomination of Mr. Idris as the next President of the Conference.

The resolution was agreed to cordially, and the officers were, on the motion of the Chairman, elected as follows:—

*President.*—T. H. W. Idris, J.P., L.C.C., F.C.S., London.

*Vice-Presidents.*—G. T. W. Newsholme, F.C.S., Sheffield ; G. D. Beggs, Dalkey, co. Dublin ; Peter Boa, Edinburgh ; W. A. H. Naylor, F.I.C., F.C.S., London ; J. W. White, Clifton, Bristol.

*Hon. Treasurer.*—J. C. Umney, F.C.S., London.

*Hon. General Secretaries.*—F. Ransom, F.C.S., Hitchin ; E. Saville Peck, M.A., Cambridge.

*Hon. Local Secretary.*—H. E. Boorne, Bristol.

*Other Members of the Executive Committee.*—Leo Atkinson, London ; E. H. Farr, F.C.S., Uckfield ; F. C. J. Bird, London ; Professor Greenish, F.I.C., F.L.S., London ; Edmund White, B.Sc., London ; W. Cummings, Dundee ; H. E. Matthews, Bristol ; C. T. Tyrer, Stratford, London ; G. T. Turner, Bristol.

*Auditors.*—J. W. Bowen, London ; W. P. Robinson, London.

*Assistant Secretary.*—John Hearn, London.

Mr. IDRIS, who was received with acclamation, said he thanked them very heartily for the proposition and vote they had just carried, by which they put him in the high and honourable position of President of the Conference. It was a post he never in his wildest dreams hoped to attain to, and he did not know the particular reasons why he had been selected. He, however, would do his best to justify their selection, and hoped they would have a very successful and happy gathering in Bristol next year.

#### VOTES OF THANKS

Mr. NEWSHOLME moved a hearty vote of thanks to the Local Committee, including Mr. Charles Kerr, Chairman ; Mr. A. B. Anderson, Vice-Chairman ; Mr. W. Cummings, Secretary ; Mr. J. M. Hardie, Treasurer ; and Mr. Russell, Chairman of the Ladies' Committee, for the excellence of the arrangements they had made for carrying out the business of the meetings. Mr. Newsholme spoke in complimentary terms of each of the gentlemen, emphasizing specially the work which Mr. Kerr had done. Mr. Kerr, he said, had been known for a great many years as a prominent pharmacist in Scotland and throughout the whole country. Mr. Newsholme also suitably acknowledged the services of Mr. Hardie and the other members.

Mr. UMNEY, in a few happy remarks, seconded, and

The PRESIDENT added some observations regarding the success of the Conference in Dundee.

The motion was passed with much enthusiasm.

Mr. KERR returned thanks for the compliment. There had certainly, he said, been a great deal of work, but it had been done with a great deal of pleasure, and every one had tried to bring it to a successful issue. The Hon. Secretary certainly deserved all praise for his labours.

Mr. A. B. ANDERSON, Mr. W. CUMMINGS, and Mr. J. M. HARDIE also replied briefly, and Mr. JAMES RUSSELL said it had been a great pleasure to them to have had the ladies from England and Ireland as well as those from Scotland, and the Ladies' Committee had co-operated very heartily with him in all that had been done for their entertainment.

Mr. J. C. C. PAYNE moved a cordial vote of thanks to the Lord Provost and Mrs. Hunter for the brilliant reception they gave the Conference in the Victoria Art Galleries on Monday. He spoke of the proceedings on that occasion as having been most agreeable in every respect. They used to hold their Conferences without civic recognition in some hall, where they quietly transacted their business and went away again. They were now being publicly received, and ladies came to the Conference.

Mr. PETER BOA formally seconded, and the PRESIDENT, in putting the motion, also took occasion to express his appreciation of the action of the Lord Provost as head of the municipality.

The motion was carried unanimously.

Mr. TYRER moved a vote of thanks to Principal Mackay, to the Council of University College and to the Professor of Chemistry for the use of the rooms in the college for the purpose of the Conference. Mr. TURNER seconded, and the motion was cordially passed.

Mr. MARTIN moved that the Conference place on record its appreciation of and thanks for the efficient and inspiring way in which the President (Mr. Druce) had conducted the business of the meeting during his presidency, and the vote was seconded by Mr. IDRIS.

Mr. ATKINS associated himself with what had been said by Mr. Martin and Mr. Idris, and said Mr. Druce's kindness, courtesy, fairness, and knowledge of the questions treated would live long in the memory of all who had been present.

The motion was passed with enthusiasm.

The PRESIDENT, in acknowledging the great kindness which had been shown him, said he had taken upon himself the duties of the Conference with great hesitation, because he knew how much the position demanded; and he felt that with only a certain

limited knowledge of a certain subject it would be almost impossible to bring it before the Conference with any degree of pleasure. For the kindness with which they had received him at Dublin last year, and still more on this occasion, he could only say, "Thank you, from the bottom of my heart."

### THE LUNCHEONS.

These were served on Tuesday and Wednesday, in excellent style, at the Queen's Hotel, the headquarters of the Conference. The close proximity of this to the University College, where the Sessions of Conference were held, greatly facilitated the punctuality of the proceedings.

### THE RECEPTION AND CONVERSAZIONE.

It has been only upon rare occasions that the Conference has been so well received and welcomed at its first gathering as it was in the Victoria Art Galleries at Dundee in 1902.

The Lord Provost and Mrs. Hunter acted as host and hostess, and were well supported by the Bailies and their wives, all of whom showed great kindness and genuine cordiality.

The guests arrived in good time, and a brilliant scene—specially enlivened by the presence of the officers of the French frigate *Ibis*—was soon witnessed of members greeting one another with hearty handshakes and wandering about in happy groups among the many valuable paintings the Picture Gallery contained, and in the buffet where refreshments were so lavishly supplied.

During the evening the Lord Provost, in a very cordial speech, welcomed the Conference to Dundee, and referred to the many changes that had taken place since their previous visit thirty-five years ago.

The President (Mr. Druce), on behalf of the Conference, acknowledged the very kind welcome which had been accorded.

A string band played an excellent selection of music, this being followed by a concert containing many capital songs well rendered by several friends, arranged by the Local Committee.

The party broke up shortly after 10 p.m. with many expressions of gratitude to the Lord Provost and Mrs. Hunter.

## THE VISIT TO ST. ANDREWS.

This took place on the Tuesday afternoon in weather which left nothing to be desired. Immediately after the Conference sitting was over a move was made to the station, which was left shortly after 4.15 p.m. The train proceeded over the world-renowned Tay Bridge, upon which the Southerners looked with feelings of admiration not unmixed with awe. After passing through St. Fort and Leuchars, the "grey old city by the sea," St. Andrews was soon reached. Here a most excellent tea was waiting for the visitors at the Volunteer Hall, together with a right royal welcome by the Provost himself.

It chanced that the Annual Fair was in full swing, and although for some reasons this was to be regretted, yet it afforded a good opportunity of studying the lighter side of the good folk of the famous city. The whole place was crowded with objects of interest, the chief of these being St. Regulus's Tower, which many climbed; the ruins of the Cathedral, the vast extent and magnificence of which all thoroughly enjoyed and admired; and then the Castle, the remains of which, standing upon an eminence overhanging "the wild waters of the bay," bespeak the scenes of many strange and stormy times.

Some made a visit to the College Church or Chapel of St. Salvator which, containing the grand tomb of Bishop Kennedy, may be considered the cradle of this, the oldest University of Scotland.

Many wandered across the famous golf links with its "bunkers," "holes" and "hazards," and thus happily whiled away the time for the return journey, via Tayport, to Dundee.

## THE DANCE AND SMOKING CONCERT.

These took place at Gray's Assembly Rooms on the Wednesday.

Mr. G. C. Druce took the chair at the latter, and for some considerable time kept things going briskly; eventually, however, it was found advisable to abandon it in favour of the dance, which increased in popularity as the evening went on.

All seemed to thoroughly abandon themselves to the infectious joyousness of the Local Committee and their young friends.

During the intervals songs were sung by Mrs. J. C. Umney

and Miss Anderson. Miss Martin played a violin solo, and Miss Kerr gave two excellent recitations.

It was felt by many to be one of the happiest and most friendly gatherings of the whole Conference.

### THE EXCURSION TO COMRIE AND ST. FILLANS.

At an early hour members were astir preparing for the day's excursion. The majority embarked on the screw steamer *Thistle* at 9.30 a.m., and proceeded under the Tay Bridge up the Firth of Tay.

Many picturesque spots were passed en route, and several interesting catches of salmon were witnessed.

Perth was reached about 11 a.m., and the party proceeded to the railway station, where they joined those who had come on from Dundee by rail.

A start was made shortly before twelve, and the journey through the exquisitely beautiful scenery of Strathearn was thoroughly enjoyed.

Comrie was reached after about an hour's run, and the company re-assembled at the West End Public Hall, tastefully decorated with emblems of national rejoicings, and found a most *recherché* luncheon awaiting them, and served up in a manner which evoked expressions of admiration from all sides.

The chair was occupied by Mr. Charles Kerr, who was supported by Colonel Williamson, Mr. Druce, Mr. Idris, Mr. Newsholme and others.

The Chairman proposed the toast of "The King." and claimed him as a fellow-student in the chemistry classes at Edinburgh under Lyon Playfair.

The toast was drunk enthusiastically and the National Anthem was sung.

Colonel Williamson, "The grand old man of Comrie," in an interesting and characteristic speech, proposed "The British Pharmaceutical Conference."

To this Mr. Druce replied in a masterly oration full of a touching sincerity and carrying the hearts of all with him.

Mr. Idris proposed "The Local Committee," heartily thanking them for splendid and eminently successful work.

Mr. Kerr briefly responded.



Mr. S. R. Atkins then proposed the health of the Ladies in his usual eloquent and graceful style.

Mr. James Russell responded in a courtly manner.

The company then journeyed to St. Fillans by coach or rail. Great things had been heard of St. Fillans, but it far surpassed previous conceptions.

The whole scene was one of great beauty and grandeur. The comely shaped hills reflected in the then placid waters of Loch Earn, and topped by sombre grey clouds, kept their majestic guard over this most secluded spot to the accompaniment of the stirring strains of some distant bagpipes upon their heather covered ridges.

The time of departure all too quickly arrived and the return journey to Comrie commenced. Here an excellent tea was in readiness, after partaking of which the Company were photographed, and then wandered about in happy groups until they re-embarked for the return journey via Perth to Dundee, which was reached shortly after 9.30 p.m.

The whole day had been most successful and thoroughly appreciated by all, making the "good-byes" and "au revoirs" all the more difficult to get through.



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# CALENDAR FOR 1902.

| JANUARY. |                | FEBRUARY. |                    | MARCH.     |                    |
|----------|----------------|-----------|--------------------|------------|--------------------|
| S        | ... 5 12 19 26 | S         | ... 2 9 16 23      | S          | ... 2 9 16 23 30   |
| M        | .. 6 13 20 27  | M         | ... 3 10 17 24     | M          | ... 3 10 17 24 31  |
| TU       | ... 7 14 21 28 | TU        | ... 4 11 18 25     | TU         | ... 4 11 18 25 ..  |
| W        | 1 8 15 22 29   | W         | ... 5 12 19 26     | W          | ... 5 12 19 26 ... |
| TH       | 2 9 16 23 30   | TH        | ... 6 13 20 27     | TH         | ... 6 13 20 27 ... |
| F        | 3 10 17 24 31  | F         | ... 7 14 21 28     | F          | ... 7 14 21 28 ... |
| S        | 4 11 18 25 ... | S         | 1 8 15 22 ...      | S          | 1 8 15 22 29 ...   |
| APRIL.   |                | MAY.      |                    | JUNE.      |                    |
| S        | ... 6 13 20 27 | S         | ... 4 11 18 25     | S          | 1 8 15 22 29       |
| M        | ... 7 14 21 28 | M         | ... 5 12 19 26     | M          | 2 9 16 23 30       |
| TU       | 1 8 15 22 29   | TU        | ... 6 13 20 27     | TU         | 3 10 17 24 ...     |
| W        | 2 9 16 23 30   | W         | ... 7 14 21 28     | W          | 4 11 18 25 ...     |
| TH       | 3 10 17 24 ... | TH        | 1 8 15 22 29       | TH         | 5 12 19 26 ...     |
| F        | 4 11 18 25 ... | F         | 2 9 16 23 30       | F          | 6 13 20 27 ...     |
| S        | 5 12 19 26 ... | S         | 3 10 17 24 31      | S          | 7 14 21 28 ...     |
| JULY.    |                | AUGUST.   |                    | SEPTEMBER. |                    |
| S        | ... 6 13 20 27 | S         | ... 3 10 17 24 31  | S          | ... 7 14 21 28     |
| M        | ... 7 14 21 28 | M         | ... 4 11 18 25 ... | M          | 1 8 15 22 29       |
| TU       | 1 8 15 22 29   | TU        | .. 5 12 19 26 ...  | TU         | 2 9 16 23 30       |
| W        | 2 9 16 23 30   | W         | ... 6 13 20 27 ... | W          | 3 10 17 24 ...     |
| TH       | 3 10 17 24 31  | TH        | ... 7 14 21 28 ... | TH         | 4 11 18 25 ...     |
| F        | 4 11 18 25 ... | F         | 1 8 15 22 29 ...   | F          | 5 12 19 26 ...     |
| S        | 5 12 19 26 ... | S         | 2 9 16 23 30 ...   | S          | 6 13 20 27 ...     |
| OCTOBER. |                | NOVEMBER. |                    | DECEMBER.  |                    |
| S        | ... 5 12 19 26 | S         | ... 2 9 16 23 30   | S          | ... 7 14 21 28     |
| M        | ... 6 13 20 27 | M         | ... 3 10 17 24 ... | M          | 1 8 15 22 29       |
| TU       | ... 7 14 21 28 | TU        | ... 4 11 18 25 ... | TU         | 2 9 16 23 30       |
| W        | 1 8 15 22 29   | W         | ... 5 12 19 26 ... | W          | 3 10 17 24 31      |
| TH       | 2 9 16 23 30   | TH        | ... 6 13 20 27 ... | TH         | 4 11 18 25 ...     |
| F        | 3 10 17 24 31  | F         | ... 7 14 21 28 ... | F          | 5 12 19 26 ...     |
| S        | 4 11 18 25 ... | S         | 1 8 15 22 29 ...   | S          | 6 13 20 27 ...     |

# CALENDAR FOR 1903.

| JANUARY. |     |    |    |        | FEBRUARY. |     |    |    |           | MARCH.     |     |    |    |        |
|----------|-----|----|----|--------|-----------|-----|----|----|-----------|------------|-----|----|----|--------|
| S        | ... | 4  | 11 | 18 25  | S         | 1   | 8  | 15 | 22        | S          | 1   | 8  | 15 | 22 29  |
| M        | ... | 5  | 12 | 19 26  | M         | 2   | 9  | 16 | 23        | M          | 2   | 9  | 16 | 23 30  |
| TU       | ... | 6  | 13 | 20 27  | TU        | 3   | 10 | 17 | 24        | TU         | 3   | 10 | 17 | 24 31  |
| W        | ... | 7  | 14 | 21 28  | W         | 4   | 11 | 18 | 25        | W          | 4   | 11 | 18 | 25 ... |
| TH       | 1   | 8  | 15 | 22 29  | TH        | 5   | 12 | 19 | 26        | TH         | 5   | 12 | 19 | 26 ... |
| F        | 2   | 9  | 16 | 23 30  | F         | 6   | 13 | 20 | 27        | F          | 6   | 13 | 20 | 27 ... |
| S        | 3   | 10 | 17 | 24 31  | S         | 7   | 14 | 21 | 28        | S          | 7   | 14 | 21 | 28 ... |
| APRIL.   |     |    |    |        | MAY.      |     |    |    |           | JUNE.      |     |    |    |        |
| S        | ... | 5  | 12 | 19 26  | S         | ... | 3  | 10 | 17 24 31  | S          | ... | 7  | 14 | 21 28  |
| M        | ... | 6  | 13 | 20 27  | M         | ... | 4  | 11 | 18 25 ... | M          | 1   | 8  | 15 | 22 29  |
| TU       | ... | 7  | 14 | 21 28  | TU        | ... | 5  | 12 | 19 26 ... | TU         | 2   | 9  | 16 | 23 30  |
| W        | 1   | 8  | 15 | 22 29  | W         | ... | 6  | 13 | 20 27 ... | W          | 3   | 10 | 17 | 24 ... |
| TH       | 2   | 9  | 16 | 23 30  | TH        | ... | 7  | 14 | 21 28 ... | TH         | 4   | 11 | 18 | 25 ... |
| F        | 3   | 10 | 17 | 24 ... | F         | 1   | 8  | 15 | 22 29 ... | F          | 5   | 12 | 19 | 26 ... |
| S        | 4   | 11 | 18 | 25 ... | S         | 2   | 9  | 16 | 23 30 ... | S          | 6   | 13 | 20 | 27 ... |
| JULY.    |     |    |    |        | AUGUST.   |     |    |    |           | SEPTEMBER. |     |    |    |        |
| S        | ... | 5  | 12 | 19 26  | S         | ... | 2  | 9  | 16 23 30  | S          | ... | 6  | 13 | 20 27  |
| M        | ... | 6  | 13 | 20 27  | M         | ... | 3  | 10 | 17 24 31  | M          | ... | 7  | 14 | 21 28  |
| TU       | ... | 7  | 14 | 21 28  | TU        | ... | 4  | 11 | 18 25 ... | TU         | 1   | 8  | 15 | 22 29  |
| W        | 1   | 8  | 15 | 22 29  | W         | ... | 5  | 12 | 19 26 ... | W          | 2   | 9  | 16 | 23 30  |
| TH       | 2   | 9  | 16 | 23 30  | TH        | ... | 6  | 13 | 20 27 ... | TH         | 3   | 10 | 17 | 24 ... |
| F        | 3   | 10 | 17 | 24 31  | F         | ... | 7  | 14 | 21 28 ... | F          | 4   | 11 | 18 | 25 ... |
| S        | 4   | 11 | 18 | 25 ... | S         | 1   | 8  | 15 | 22 29 ... | S          | 5   | 12 | 19 | 26 ... |
| OCTOBER. |     |    |    |        | NOVEMBER. |     |    |    |           | DECEMBER.  |     |    |    |        |
| S        | ... | 4  | 11 | 18 25  | S         | 1   | 8  | 15 | 22 29     | S          | ... | 6  | 13 | 20 27  |
| M        | ... | 5  | 12 | 19 26  | M         | 2   | 9  | 16 | 23 30     | M          | ... | 7  | 14 | 21 28  |
| TU       | ... | 6  | 13 | 20 27  | TU        | 3   | 10 | 17 | 24 ...    | TU         | 1   | 8  | 15 | 22 29  |
| W        | ... | 7  | 14 | 21 28  | W         | 4   | 11 | 18 | 25 ...    | W          | 2   | 9  | 16 | 23 30  |
| TH       | 1   | 8  | 15 | 22 29  | TH        | 5   | 12 | 19 | 26 ...    | TH         | 3   | 10 | 17 | 24 31  |
| F        | 2   | 9  | 16 | 23 30  | F         | 6   | 13 | 20 | 27 ...    | F          | 4   | 11 | 18 | 25 ... |
| S        | 3   | 10 | 17 | 24 31  | S         | 7   | 14 | 21 | 28 ...    | S          | 5   | 12 | 19 | 26 ... |

AVERAGE LIMITS OF SPECIFIC GRAVITIES OF TINCTURES,  
B.P., 1898.

| Name of Tincture.                     | Specific Gravity at 15°C. |
|---------------------------------------|---------------------------|
| Tinct. Aconiti . . . . .              | .890- .895                |
| " Aloes . . . . .                     | .970- .975                |
| " Arnicae . . . . .                   | .890- .895                |
| " Asafetidae . . . . .                | .910- .915                |
| " Aurantii recentis . . . . .         | .875- .885                |
| " Belladonnae . . . . .               | .910- .915                |
| " Benzoin Co. . . . .                 | .890- .900                |
| " Buchu . . . . .                     | .925- .930                |
| " Calumbae . . . . .                  | .915- .920                |
| " Camphorae Co. . . . .               | .915- .920                |
| " Cannabis Indicae . . . . .          | .845- .850                |
| " Cantharidis . . . . .               | .835- .840                |
| " Capsici . . . . .                   | .890- .895                |
| " Cardamomi Co. . . . .               | .945- .950                |
| " Cascarillae . . . . .               | .895- .900                |
| " Catechu . . . . .                   | .975- .980                |
| " Chiratae . . . . .                  | .920- .925                |
| " Chloroform et Morphinae Co. . . . . | 1.010-1.015               |
| " Cimicifugae . . . . .               | .925- .930                |
| " Cinchonae . . . . .                 | .915- .920                |
| "       "       Co. . . . .           | .915- .920                |
| " Cinnamomi . . . . .                 | .900- .905                |
| " Cocci . . . . .                     | .950- .955                |
| " Colchici Sem. . . . .               | .950- .955                |
| " Conii . . . . .                     | .895- .900                |
| " Croci . . . . .                     | .925- .930                |
| " Cubebae . . . . .                   | .840- .845                |
| " Digitalis . . . . .                 | .930- .935                |
| " Ergotae Ammon. . . . .              | .930- .935                |
| " Ferri Perchloridi . . . . .         | 1.085-1.088               |
| " Gelsemii . . . . .                  | .920- .925                |
| " Gentianae Co. . . . .               | .965- .970                |
| " Guaiaci Ammon. . . . .              | .895- .900                |
| " Hamamelidis . . . . .               | .947- .952                |
| " Hydrastis . . . . .                 | .920- .925                |
| " Hyoscyami . . . . .                 | .950- .955                |
| " Iodi . . . . .                      | .875- .880                |
| " Jaborandi . . . . .                 | .950- .955                |
| " Jalapae . . . . .                   | .905- .910                |







| Name of Tincture | Specific Gravity at 15°C. |
|------------------|---------------------------|
| Tinct Kino       | 995-1 000                 |
| „ Krameriæ       | 935- 940                  |
| „ Lavandulæ Co   | 885- 840                  |
| Limonis          | 875- 885                  |
| Lobeliæ Ætheria  | 815- 820                  |
| Lupuli           | 985- 940                  |
| Myrrhæ           | 845- 855                  |
| Nucis Vomicae    | 910- 915                  |
| Opii             | 950- 965                  |
| „ Ammon          | 895- 900                  |
| Podophylli       | 815- 850                  |
| Pruni Virg       | 935- 940                  |
| Pyrethri         | 900- 905                  |
| Quassia          | 945- 950                  |
| Quillaiæ         | 920- 925                  |
| Quinina          | 885- 895                  |
| „ Ammon          | 925- 930                  |
| Rhei Co.         | 970- 975                  |
| Scillæ           | 960- 970                  |
| Senggæ           | 935- 940                  |
| Sennæ Co         | 985- 995                  |
| Serpentariæ      | 895- 900                  |
| Stramonii        | 955- 960                  |
| Strophanthi      | 890- 895                  |
| Sumbul           | 900- 905                  |
| Tolutana         | 860- 865                  |
| Valerianæ Ammon  | 910- 945                  |
| Zingiberis       | 840- 845                  |

TABLE FOR CONVERSION OF GRAINS INTO GRAMS.

| Grns. | Grms.  | Grns. | Grms.  | Grns. | Grms.  | Grns. | Grms.   |
|-------|--------|-------|--------|-------|--------|-------|---------|
| 1     | ·0648  | 54    | 3·4991 | 103   | 6·6743 | 152   | 9·8494  |
| 2     | ·1296  | 55    | 3·5639 | 104   | 6·7391 | 153   | 9·9142  |
| 3     | ·1944  | 56    | 3·6287 | 105   | 6·8039 | 154   | 9·9790  |
| 4     | ·3240  | 57    | 3·6935 | 106   | 6·8687 | 155   | 10·0438 |
| 6     | ·3888  | 58    | 3·7583 | 107   | 6·9335 | 156   | 10·1086 |
| 7     | ·4536  | 59    | 3·8231 | 108   | 6·9983 | 157   | 10·1734 |
| 8     | ·5184  | 60    | 3·8879 | 109   | 7·0631 | 158   | 10·2382 |
| 10    | ·6480  | 61    | 3·9527 | 110   | 7·1279 | 159   | 10·3030 |
| 11    | ·7128  | 62    | 4·0175 | 111   | 7·1927 | 160   | 10·3678 |
| 12    | ·7776  | 63    | 4·0823 | 112   | 7·2575 | 161   | 10·4326 |
| 13    | ·8424  | 64    | 4·1471 | 113   | 7·3223 | 162   | 10·4974 |
| 15    | ·9720  | 65    | 4·2119 | 114   | 7·3871 | 163   | 10·5622 |
| 16    | 1·0368 | 66    | 4·2767 | 115   | 7·4519 | 164   | 10·6270 |
| 17    | 1·1016 | 67    | 4·3415 | 116   | 7·5177 | 165   | 10·6918 |
| 18    | 1·1664 | 68    | 4·4063 | 117   | 7·5815 | 166   | 10·7566 |
| 20    | 1·2960 | 69    | 4·4711 | 118   | 7·6463 | 167   | 10·8214 |
| 21    | 1·3608 | 70    | 4·5359 | 119   | 7·7111 | 168   | 10·8862 |
| 22    | 1·4256 | 71    | 4·6007 | 120   | 7·7759 | 169   | 10·9510 |
| 23    | 1·4904 | 72    | 4·6655 | 121   | 7·8407 | 170   | 11·0158 |
| 24    | 1·5552 | 73    | 4·7303 | 122   | 7·9055 | 171   | 11·0806 |
| 25    | 1·6200 | 74    | 4·7951 | 123   | 7·9703 | 172   | 11·1454 |
| 26    | 1·6848 | 75    | 4·8599 | 124   | 8·0351 | 173   | 11·2102 |
| 27    | 1·7496 | 76    | 4·9247 | 125   | 8·0999 | 174   | 11·2750 |
| 28    | 1·8144 | 77    | 4·9895 | 126   | 8·1647 | 175   | 11·3398 |
| 29    | 1·8792 | 78    | 5·0543 | 127   | 8·2295 | 176   | 11·4046 |
| 30    | 1·9440 | 79    | 5·1191 | 128   | 8·2943 | 177   | 11·4694 |
| 31    | 2·0088 | 80    | 5·1839 | 129   | 8·3591 | 178   | 11·5342 |
| 32    | 2·0736 | 81    | 5·2487 | 130   | 8·4239 | 179   | 11·5990 |
| 33    | 2·1384 | 82    | 5·3135 | 131   | 8·4887 | 180   | 11·6638 |
| 34    | 2·2032 | 83    | 5·3783 | 132   | 8·5535 | 181   | 11·7286 |
| 35    | 2·2680 | 84    | 5·4431 | 133   | 8·6183 | 182   | 11·7934 |
| 36    | 2·3328 | 85    | 5·5079 | 134   | 8·6831 | 183   | 11·8582 |
| 37    | 2·3976 | 86    | 5·5727 | 135   | 8·7479 | 184   | 11·9230 |
| 38    | 2·4624 | 87    | 5·6375 | 136   | 8·8127 | 185   | 11·9878 |
| 39    | 2·5272 | 88    | 5·7023 | 137   | 8·8775 | 186   | 12·0526 |
| 40    | 2·5920 | 89    | 5·7671 | 138   | 8·9423 | 187   | 12·1174 |
| 41    | 2·6568 | 90    | 5·8319 | 139   | 9·0071 | 188   | 12·1822 |
| 42    | 2·7215 | 91    | 5·8967 | 140   | 9·0718 | 189   | 12·2470 |
| 43    | 2·7863 | 92    | 5·9615 | 141   | 9·1366 | 190   | 12·3118 |
| 44    | 2·8511 | 93    | 6·0263 | 142   | 9·2014 | 200   | 12·9598 |
| 45    | 2·9159 | 94    | 6·0911 | 143   | 9·2662 | 250   | 16·1997 |
| 46    | 2·9807 | 95    | 6·1559 | 144   | 9·3310 | 300   | 19·4897 |
| 47    | 3·0455 | 96    | 6·2207 | 145   | 9·3958 | 400   | 25·9196 |
| 48    | 3·1103 | 97    | 6·2855 | 146   | 9·4606 | 500   | 32·8995 |
| 49    | 3·1751 | 98    | 6·3503 | 147   | 9·5254 | 600   | 38·8794 |
| 50    | 3·2399 | 99    | 6·4151 | 148   | 9·5902 | 700   | 45·8598 |
| 51    | 3·3047 | 100   | 6·4799 | 149   | 9·6550 | 800   | 51·8892 |
| 52    | 3·3695 | 101   | 6·5447 | 150   | 9·7198 | 900   | 58·8190 |
| 53    | 3·4343 | 102   | 6·6095 | 151   | 9·7846 | 1000  | 64·7989 |

## CONVERSION OF THERMOMETRIC SCALES.

TABLE I.

| Fahr. | Cent. | Fahr. | Cent. | Fahr. | Cent. | Fahr. | Cent. |
|-------|-------|-------|-------|-------|-------|-------|-------|
| 400   | 204.4 | 348   | 175.6 | 296   | 146.7 | 244   | 117.8 |
| 399   | 203.9 | 347   | 175.0 | 295   | 146.1 | 243   | 117.2 |
| 398   | 203.8 | 346   | 174.4 | 294   | 145.6 | 242   | 116.7 |
| 397   | 202.8 | 345   | 173.9 | 293   | 145.0 | 241   | 116.1 |
| 396   | 202.2 | 344   | 173.3 | 292   | 144.4 | 240   | 115.6 |
| 395   | 201.7 | 343   | 172.8 | 291   | 143.9 | 239   | 115.0 |
| 394   | 201.1 | 342   | 172.2 | 290   | 143.3 | 238   | 114.4 |
| 393   | 200.6 | 341   | 171.7 | 289   | 142.8 | 237   | 113.9 |
| 392   | 200.0 | 340   | 171.1 | 288   | 142.2 | 236   | 113.3 |
| 391   | 199.4 | 339   | 170.6 | 287   | 141.7 | 235   | 112.8 |
| 390   | 198.9 | 338   | 170.0 | 286   | 141.1 | 234   | 112.2 |
| 389   | 198.3 | 337   | 169.4 | 285   | 140.6 | 233   | 111.7 |
| 388   | 197.8 | 336   | 168.9 | 284   | 140.0 | 232   | 111.1 |
| 387   | 197.2 | 335   | 168.3 | 283   | 139.4 | 231   | 110.6 |
| 386   | 196.7 | 334   | 167.8 | 282   | 138.9 | 230   | 110.0 |
| 385   | 196.1 | 333   | 167.2 | 281   | 138.3 | 229   | 109.4 |
| 384   | 195.6 | 332   | 166.7 | 280   | 137.8 | 228   | 108.9 |
| 383   | 195.0 | 331   | 166.1 | 279   | 137.2 | 227   | 108.3 |
| 382   | 194.4 | 330   | 165.6 | 278   | 136.7 | 226   | 107.8 |
| 381   | 193.9 | 329   | 165.0 | 277   | 136.1 | 225   | 107.2 |
| 380   | 193.3 | 328   | 164.4 | 276   | 135.6 | 224   | 106.7 |
| 379   | 192.8 | 327   | 163.9 | 275   | 135.0 | 223   | 106.1 |
| 378   | 192.2 | 326   | 163.3 | 274   | 134.4 | 222   | 105.6 |
| 377   | 191.7 | 325   | 162.8 | 273   | 133.9 | 221   | 105.0 |
| 376   | 191.1 | 324   | 162.2 | 272   | 133.3 | 220   | 104.4 |
| 375   | 190.6 | 323   | 161.7 | 271   | 132.8 | 219   | 103.9 |
| 374   | 190.0 | 322   | 161.1 | 270   | 132.2 | 218   | 103.3 |
| 373   | 189.4 | 321   | 160.6 | 269   | 131.7 | 217   | 102.8 |
| 372   | 188.9 | 320   | 160.0 | 268   | 131.1 | 216   | 102.2 |
| 371   | 188.3 | 319   | 159.4 | 267   | 130.6 | 215   | 101.7 |
| 370   | 187.8 | 318   | 158.9 | 266   | 130.0 | 214   | 101.1 |
| 369   | 187.2 | 317   | 158.3 | 265   | 129.4 | 213   | 100.6 |
| 368   | 186.7 | 316   | 157.8 | 264   | 128.9 | 212   | 100.0 |
| 367   | 186.1 | 315   | 157.2 | 263   | 128.3 | 211   | 99.4  |
| 366   | 185.6 | 314   | 156.7 | 262   | 127.8 | 210   | 98.9  |
| 365   | 185.0 | 313   | 156.1 | 261   | 127.2 | 209   | 98.3  |
| 364   | 184.4 | 312   | 155.6 | 260   | 126.7 | 208   | 97.8  |
| 363   | 183.9 | 311   | 155.0 | 259   | 126.1 | 207   | 97.2  |
| 362   | 183.3 | 310   | 154.4 | 258   | 125.6 | 206   | 96.7  |
| 361   | 182.8 | 309   | 153.9 | 257   | 125.0 | 205   | 96.1  |
| 360   | 182.2 | 308   | 153.3 | 256   | 124.4 | 204   | 95.6  |
| 359   | 181.7 | 307   | 152.8 | 255   | 123.9 | 203   | 95.0  |
| 358   | 181.1 | 306   | 152.2 | 254   | 123.3 | 202   | 94.4  |
| 357   | 180.6 | 305   | 151.7 | 253   | 122.8 | 201   | 93.9  |
| 356   | 180.0 | 304   | 151.1 | 252   | 122.2 | 200   | 93.3  |
| 355   | 179.4 | 303   | 150.6 | 251   | 121.7 | 199   | 92.8  |
| 354   | 178.9 | 302   | 150.0 | 250   | 121.1 | 198   | 92.2  |
| 353   | 178.3 | 301   | 149.4 | 249   | 120.6 | 197   | 91.7  |
| 352   | 177.8 | 300   | 148.9 | 248   | 120.0 | 196   | 91.1  |
| 351   | 177.2 | 299   | 148.3 | 247   | 119.4 | 195   | 90.6  |
| 350   | 176.7 | 298   | 147.8 | 246   | 118.9 | 194   | 90.0  |
| 349   | 176.1 | 297   | 147.2 | 245   | 118.3 | 193   | 89.4  |

CONVERSION OF THERMOMETRIC SCALES (*continued*).

| Fahr. | Cent. | Fahr. | Cent. | Fahr. | Cent. | Fahr. | Cent. |
|-------|-------|-------|-------|-------|-------|-------|-------|
| 192   | 88.9  | 186   | 57.8  | 80    | 26.7  | 24    | - 4.4 |
| 191   | 88.8  | 185   | 57.2  | 79    | 26.1  | 23    | - 5.0 |
| 190   | 87.8  | 184   | 56.7  | 78    | 25.6  | 22    | - 5.6 |
| 189   | 87.2  | 183   | 56.1  | 77    | 25.0  | 21    | - 6.1 |
| 188   | 86.7  | 182   | 55.6  | 76    | 24.4  | 20    | - 6.7 |
| 187   | 86.1  | 181   | 55.0  | 75    | 23.9  | 19    | - 7.2 |
| 186   | 85.6  | 180   | 54.4  | 74    | 23.3  | 18    | - 7.8 |
| 185   | 85.0  | 129   | 53.9  | 73    | 22.8  | 17    | - 8.3 |
| 184   | 84.4  | 128   | 53.3  | 72    | 22.2  | 16    | - 8.9 |
| 183   | 83.9  | 127   | 52.8  | 71    | 21.7  | 15    | - 9.5 |
| 182   | 83.3  | 126   | 52.2  | 70    | 21.1  | 14    | -10.0 |
| 181   | 82.8  | 125   | 51.7  | 69    | 20.6  | 13    | -10.6 |
| 180   | 82.2  | 124   | 51.1  | 68    | 20.0  | 12    | -11.1 |
| 179   | 81.7  | 123   | 50.6  | 67    | 19.4  | 11    | -11.7 |
| 178   | 81.1  | 122   | 50.0  | 66    | 18.9  | 10    | -12.2 |
| 177   | 80.6  | 121   | 49.4  | 65    | 18.3  | 9     | -12.8 |
| 176   | 80.0  | 120   | 48.9  | 64    | 17.8  | 8     | -13.3 |
| 175   | 79.4  | 119   | 48.3  | 63    | 17.2  | 7     | -13.9 |
| 174   | 78.9  | 118   | 47.8  | 62    | 16.7  | 6     | -14.4 |
| 173   | 78.3  | 117   | 47.2  | 61    | 16.1  | 5     | -15.0 |
| 172   | 77.8  | 116   | 46.7  | 60    | 15.6  | 4     | -15.6 |
| 171   | 77.2  | 115   | 46.1  | 59    | 15.0  | 3     | -16.1 |
| 170   | 76.7  | 114   | 45.6  | 58    | 14.4  | 2     | -16.7 |
| 169   | 76.1  | 113   | 45.0  | 57    | 13.9  | 1     | -17.2 |
| 168   | 75.6  | 112   | 44.4  | 56    | 13.3  | 0     | -17.8 |
| 167   | 75.0  | 111   | 43.9  | 55    | 12.8  | - 1   | -18.3 |
| 166   | 74.4  | 110   | 43.3  | 54    | 12.2  | - 2   | -18.9 |
| 165   | 73.9  | 109   | 42.8  | 53    | 11.7  | - 3   | -19.4 |
| 164   | 73.3  | 108   | 42.2  | 52    | 11.1  | - 4   | -20.0 |
| 163   | 72.8  | 107   | 41.7  | 51    | 10.6  | - 5   | -20.6 |
| 162   | 72.2  | 106   | 41.1  | 50    | 10.0  | - 6   | -21.1 |
| 161   | 71.7  | 105   | 40.6  | 49    | 9.4   | - 7   | -21.7 |
| 160   | 71.1  | 104   | 40.0  | 48    | 8.9   | - 8   | -22.2 |
| 159   | 70.6  | 103   | 39.4  | 47    | 8.3   | - 9   | -22.8 |
| 158   | 70.0  | 102   | 38.9  | 46    | 7.8   | -10   | -23.3 |
| 157   | 69.4  | 101   | 38.3  | 45    | 7.2   | -11   | -23.9 |
| 156   | 68.9  | 100   | 37.8  | 44    | 6.7   | -12   | -24.4 |
| 155   | 68.3  | 99    | 37.2  | 43    | 6.1   | -13   | -25.0 |
| 154   | 67.8  | 98    | 36.7  | 42    | 5.6   | -14   | -25.6 |
| 153   | 67.2  | 97    | 36.1  | 41    | 5.0   | -15   | -26.1 |
| 152   | 66.7  | 96    | 35.6  | 40    | 4.4   | -16   | -26.7 |
| 151   | 66.1  | 95    | 35.0  | 39    | 3.9   | -17   | -27.2 |
| 150   | 65.6  | 94    | 34.4  | 38    | 3.3   | -18   | -27.8 |
| 149   | 65.0  | 93    | 33.9  | 37    | 2.8   | -19   | -28.3 |
| 148   | 64.4  | 92    | 33.3  | 36    | 2.2   | - 20  | -28.9 |
| 147   | 63.9  | 91    | 32.8  | 35    | 1.7   | -21   | -29.4 |
| 146   | 63.3  | 90    | 32.2  | 34    | 1.1   | -22   | -30.0 |
| 145   | 62.8  | 89    | 31.7  | 33    | 0.6   | -23   | -30.6 |
| 144   | 62.2  | 88    | 31.1  | 32    | 0.0   | -24   | -31.1 |
| 143   | 61.7  | 87    | 30.6  | 31    | -0.6  | -25   | -31.7 |
| 142   | 61.1  | 86    | 30.0  | 30    | -1.1  | -26   | -32.2 |
| 141   | 60.6  | 85    | 29.4  | 29    | -1.7  | -27   | -32.8 |
| 140   | 60.0  | 84    | 28.9  | 28    | -2.2  | -28   | -33.3 |
| 139   | 59.4  | 83    | 28.3  | 27    | -2.8  | -29   | -33.9 |
| 138   | 58.9  | 82    | 27.8  | 26    | -3.3  | -30   | -34.4 |
| 137   | 58.3  | 81    | 27.2  | 25    | -3.9  | -31   | -35.0 |

TABLE SHOWING THE VALUE OF 1 LB. AND 1 CWT. IN ENGLISH  
MONEY WHEN THE ARTICLE IS QUOTED  
PER KILO IN FRANCS.

| If 1 kilo costs |     | 1 lb. will cost |    |                 | 1 cwt. will cost |    |                 | If 1 kilo costs |     | 1 lb. will cost |    |                 | 1 cwt. will cost |    |                 |
|-----------------|-----|-----------------|----|-----------------|------------------|----|-----------------|-----------------|-----|-----------------|----|-----------------|------------------|----|-----------------|
| Fr.             | cts | £               | s. | d.              | £                | s. | d.              | Fr.             | cts | £               | s. | d.              | £                | s. | d.              |
| -               | 5   | -               | -  | $\frac{1}{4}$   | -                | 2  | $0\frac{1}{2}$  | 2               | 50  | -               | -  | $10\frac{7}{8}$ | 5                | 1  | $7\frac{1}{4}$  |
| -               | 10  | -               | -  | $\frac{1}{2}$   | -                | 4  | $0\frac{1}{2}$  | 2               | 55  | -               | -  | $11\frac{1}{8}$ | 5                | 8  | $7\frac{1}{2}$  |
| -               | 15  | -               | -  | $\frac{3}{4}$   | -                | 6  | $1\frac{1}{4}$  | 2               | 60  | -               | -  | $11\frac{3}{8}$ | 5                | 5  | 8               |
| -               | 20  | -               | -  | 1               | -                | 8  | $1\frac{1}{2}$  | 2               | 65  | -               | -  | $11\frac{5}{8}$ | 5                | 7  | $8\frac{1}{2}$  |
| -               | 25  | -               | -  | $1\frac{1}{4}$  | -                | 10 | 2               | 2               | 70  | -               | -  | $11\frac{7}{8}$ | 5                | 9  | $8\frac{3}{4}$  |
| -               | 30  | -               | -  | $1\frac{1}{2}$  | -                | 12 | $2\frac{1}{2}$  | 2               | 75  | -               | 1  | 0               | 5                | 11 | 9               |
| -               | 35  | -               | -  | $1\frac{3}{4}$  | -                | 14 | $2\frac{3}{4}$  | 2               | 80  | -               | 1  | $0\frac{1}{4}$  | 5                | 18 | $9\frac{1}{2}$  |
| -               | 40  | -               | -  | 1 $\frac{3}{4}$ | -                | 16 | 3               | 2               | 85  | -               | 1  | $0\frac{1}{2}$  | 5                | 15 | $9\frac{3}{4}$  |
| -               | 45  | -               | -  | 2               | -                | 18 | $3\frac{1}{4}$  | 2               | 90  | -               | 1  | $0\frac{3}{4}$  | 5                | 17 | $10\frac{1}{4}$ |
| -               | 50  | -               | -  | $2\frac{1}{4}$  | 1                | 0  | $3\frac{1}{4}$  | 2               | 95  | -               | 1  | $0\frac{7}{8}$  | 5                | 19 | $10\frac{3}{4}$ |
| -               | 55  | -               | -  | $2\frac{1}{2}$  | 1                | 2  | $4\frac{1}{4}$  | 3               | 0   | -               | 1  | $1\frac{1}{8}$  | 6                | 1  | $11\frac{1}{4}$ |
| -               | 60  | -               | -  | $2\frac{3}{4}$  | 1                | 4  | $4\frac{1}{2}$  | 3               | 5   | -               | 1  | $1\frac{1}{4}$  | 6                | 3  | $11\frac{1}{2}$ |
| -               | 65  | -               | -  | 2 $\frac{3}{4}$ | 1                | 6  | 5               | 3               | 10  | -               | 1  | $1\frac{1}{2}$  | 6                | 5  | $11\frac{3}{4}$ |
| -               | 70  | -               | -  | $3\frac{1}{8}$  | 1                | 8  | 5               | 3               | 15  | -               | 1  | $1\frac{3}{4}$  | 6                | 8  | $0\frac{1}{4}$  |
| -               | 75  | -               | -  | $3\frac{1}{4}$  | 1                | 10 | $5\frac{3}{4}$  | 3               | 20  | -               | 1  | $1\frac{7}{8}$  | 6                | 10 | $0\frac{3}{4}$  |
| -               | 80  | -               | -  | $3\frac{1}{2}$  | 1                | 12 | $6\frac{1}{4}$  | 3               | 25  | -               | 1  | $2\frac{1}{8}$  | 6                | 12 | 1               |
| -               | 85  | -               | -  | $3\frac{3}{4}$  | 1                | 14 | $6\frac{1}{2}$  | 3               | 30  | -               | 1  | $2\frac{3}{8}$  | 6                | 14 | $1\frac{1}{2}$  |
| -               | 90  | -               | -  | $3\frac{7}{8}$  | 1                | 16 | 7               | 3               | 35  | -               | 1  | $2\frac{5}{8}$  | 6                | 16 | $1\frac{3}{4}$  |
| -               | 95  | -               | -  | $4\frac{1}{8}$  | 1                | 18 | $7\frac{1}{4}$  | 3               | 40  | -               | 1  | $2\frac{7}{8}$  | 6                | 18 | $2\frac{1}{4}$  |
| 1               | 0   | -               | -  | $4\frac{1}{4}$  | 2                | 0  | $7\frac{1}{2}$  | 3               | 45  | -               | 1  | 3               | 7                | 0  | $2\frac{3}{4}$  |
| 1               | 5   | -               | -  | $4\frac{3}{4}$  | 2                | 2  | $8\frac{1}{4}$  | 3               | 50  | -               | 1  | $3\frac{1}{4}$  | 7                | 2  | 3               |
| 1               | 10  | -               | -  | 5               | 2                | 4  | $8\frac{3}{4}$  | 3               | 55  | -               | 1  | $3\frac{3}{8}$  | 7                | 4  | $3\frac{1}{2}$  |
| 1               | 15  | -               | -  | $5\frac{1}{4}$  | 2                | 6  | $8\frac{1}{2}$  | 3               | 60  | -               | 1  | $3\frac{5}{8}$  | 7                | 6  | $3\frac{3}{4}$  |
| 1               | 20  | -               | -  | $5\frac{1}{2}$  | 2                | 8  | 9               | 3               | 65  | -               | 1  | $3\frac{7}{8}$  | 7                | 8  | 4               |
| 1               | 25  | -               | -  | $5\frac{3}{4}$  | 2                | 10 | $9\frac{1}{2}$  | 3               | 70  | -               | 1  | $4\frac{1}{8}$  | 7                | 10 | $4\frac{1}{4}$  |
| 1               | 30  | -               | -  | $5\frac{7}{8}$  | 2                | 12 | 10              | 3               | 75  | -               | 1  | $4\frac{3}{8}$  | 7                | 12 | $4\frac{3}{4}$  |
| 1               | 35  | -               | -  | $5\frac{7}{8}$  | 2                | 14 | $10\frac{1}{4}$ | 3               | 80  | -               | 1  | $4\frac{1}{2}$  | 7                | 14 | $5\frac{1}{4}$  |
| 1               | 40  | -               | -  | 6               | 2                | 16 | $10\frac{3}{4}$ | 3               | 85  | -               | 1  | $4\frac{3}{4}$  | 7                | 16 | $5\frac{1}{2}$  |
| 1               | 45  | -               | -  | $6\frac{1}{8}$  | 2                | 18 | 11              | 3               | 90  | -               | 1  | 5               | 7                | 18 | 6               |
| 1               | 50  | -               | -  | $6\frac{1}{4}$  | 3                | 0  | $11\frac{1}{2}$ | 3               | 95  | -               | 1  | $5\frac{1}{4}$  | 8                | 0  | $6\frac{1}{2}$  |
| 1               | 55  | -               | -  | $6\frac{3}{4}$  | 3                | 3  | 0               | 4               | 0   | -               | 1  | $5\frac{3}{8}$  | 8                | 2  | 7               |
| 1               | 60  | -               | -  | 7               | 3                | 5  | $0\frac{1}{4}$  | 4               | 5   | -               | 1  | $5\frac{5}{8}$  | 8                | 4  | $7\frac{1}{2}$  |
| 1               | 65  | -               | -  | $7\frac{1}{4}$  | 3                | 7  | $0\frac{1}{2}$  | 4               | 10  | -               | 1  | $5\frac{7}{8}$  | 8                | 6  | $7\frac{3}{4}$  |
| 1               | 70  | -               | -  | $7\frac{3}{8}$  | 3                | 9  | 1               | 4               | 15  | -               | 1  | $6\frac{1}{8}$  | 8                | 8  | 8               |
| 1               | 75  | -               | -  | $7\frac{5}{8}$  | 3                | 11 | $1\frac{1}{2}$  | 4               | 20  | -               | 1  | $6\frac{3}{8}$  | 8                | 10 | $8\frac{1}{4}$  |
| 1               | 80  | -               | -  | $7\frac{7}{8}$  | 3                | 13 | 2               | 4               | 25  | -               | 1  | $6\frac{5}{8}$  | 8                | 12 | $8\frac{3}{4}$  |
| 1               | 85  | -               | -  | $8\frac{1}{8}$  | 3                | 15 | $2\frac{1}{4}$  | 4               | 30  | -               | 1  | $6\frac{7}{8}$  | 8                | 14 | 9               |
| 1               | 90  | -               | -  | $8\frac{3}{4}$  | 3                | 17 | $2\frac{3}{4}$  | 4               | 35  | -               | 1  | $6\frac{7}{8}$  | 8                | 16 | $9\frac{1}{2}$  |
| 1               | 95  | -               | -  | $8\frac{7}{8}$  | 3                | 19 | 3               | 4               | 40  | -               | 1  | $7\frac{1}{8}$  | 8                | 18 | $9\frac{3}{4}$  |
| 2               | 0   | -               | -  | $8\frac{3}{4}$  | 4                | 1  | $3\frac{1}{4}$  | 4               | 45  | -               | 1  | $7\frac{3}{8}$  | 9                | 0  | $10\frac{1}{4}$ |
| 2               | 5   | -               | -  | $8\frac{5}{8}$  | 4                | 3  | $3\frac{3}{4}$  | 4               | 50  | -               | 1  | $7\frac{5}{8}$  | 9                | 2  | $10\frac{3}{4}$ |
| 2               | 10  | -               | -  | $9\frac{1}{8}$  | 4                | 5  | 4               | 4               | 55  | -               | 1  | $7\frac{7}{8}$  | 9                | 4  | 11              |
| 2               | 15  | -               | -  | $9\frac{3}{8}$  | 4                | 7  | $4\frac{1}{4}$  | 4               | 60  | -               | 1  | 8               | 9                | 6  | $11\frac{1}{2}$ |
| 2               | 20  | -               | -  | $9\frac{5}{8}$  | 4                | 9  | $4\frac{3}{4}$  | 4               | 65  | -               | 1  | $8\frac{1}{4}$  | 9                | 8  | $11\frac{3}{4}$ |
| 2               | 25  | -               | -  | $9\frac{7}{8}$  | 4                | 11 | $5\frac{1}{4}$  | 4               | 70  | -               | 1  | $8\frac{3}{8}$  | 9                | 11 | $0\frac{1}{4}$  |
| 2               | 30  | -               | -  | 10              | 4                | 13 | $5\frac{3}{4}$  | 4               | 75  | -               | 1  | $8\frac{5}{8}$  | 9                | 13 | $0\frac{3}{4}$  |
| 2               | 35  | -               | -  | $10\frac{1}{4}$ | 4                | 15 | 6               | 4               | 80  | -               | 1  | $8\frac{7}{8}$  | 9                | 15 | 1               |
| 2               | 40  | -               | -  | $10\frac{3}{8}$ | 4                | 17 | $6\frac{1}{2}$  | 4               | 85  | -               | 1  | $9\frac{1}{8}$  | 9                | 17 | $1\frac{1}{2}$  |
| 2               | 45  | -               | -  | $10\frac{5}{8}$ | 4                | 19 | 7               | 4               | 90  | -               | 1  | $9\frac{3}{8}$  | 9                | 19 | $1\frac{3}{4}$  |

TABLE SHOWING THE VALUE OF 1 LB. AND 1 CWT. IN ENGLISH  
MONEY WHEN THE ARTICLE IS QUOTED PER KILO  
IN FRANCS (*continued*).

| If 1 kilo costs |      | 1 lb. will cost |    |     | 1 cwt. will cost |    |     | If 1 kilo costs |      | 1 lb. will cost |    |     | 1 cwt. will cost |    |     |
|-----------------|------|-----------------|----|-----|------------------|----|-----|-----------------|------|-----------------|----|-----|------------------|----|-----|
| Ft.             | cts. | £               | s. | d.  | £                | s. | d.  | Fr.             | cts. | £               | s. | d.  | £                | s. | d.  |
| 4               | 95   | -               | 1  | 9½  | 10               | 1  | 2½  | 8               | 80   | -               | 8  | 2½  | 17               | 17 | 7½  |
| 5               | 0    | -               | 1  | 9½  | 10               | 3  | 2½  | 8               | 90   | -               | 8  | 2½  | 18               | 1  | 8½  |
| 5               | 10   | -               | 1  | 10½ | 10               | 7  | 8½  | 9               | 0    | -               | 8  | 3½  | 18               | 5  | 9½  |
| 5               | 20   | -               | 1  | 10½ | 10               | 11 | 4   | 9               | 10   | -               | 8  | 3½  | 18               | 9  | 10½ |
| 5               | 30   | -               | 1  | 11½ | 10               | 15 | 4½  | 9               | 20   | -               | 8  | 4   | 18               | 18 | 10½ |
| 5               | 40   | -               | 1  | 11½ | 10               | 19 | 5½  | 9               | 30   | -               | 3  | 4½  | 18               | 17 | 11½ |
| 5               | 50   | -               | 1  | 11½ | 11               | 3  | 6½  | 9               | 40   | -               | 8  | 4½  | 19               | 2  | 0½  |
| 5               | 60   | -               | 2  | 0½  | 11               | 7  | 7½  | 9               | 50   | -               | 8  | 5½  | 19               | 6  | 1½  |
| 5               | 70   | -               | 2  | 0½  | 11               | 11 | 8   | 9               | 60   | -               | 3  | 5½  | 19               | 10 | 2   |
| 5               | 80   | -               | 2  | 1½  | 11               | 15 | 8½  | 9               | 70   | -               | 3  | 6½  | 19               | 14 | 2½  |
| 5               | 90   | -               | 2  | 1½  | 11               | 19 | 9½  | 9               | 80   | -               | 3  | 6½  | 19               | 18 | 3½  |
| 6               | 0    | -               | 2  | 2½  | 12               | 3  | 10½ | 9               | 90   | -               | 3  | 7½  | 20               | 2  | 4½  |
| 6               | 10   | -               | 2  | 2½  | 12               | 7  | 11  | 10              | -    | -               | 3  | 7½  | 20               | 6  | 5   |
| 6               | 20   | -               | 2  | 3   | 12               | 11 | 11½ | 11              | -    | -               | 3  | 11½ | 22               | 7  | 0½  |
| 6               | 30   | -               | 2  | 3½  | 12               | 16 | 0½  | 12              | -    | -               | 4  | 4½  | 24               | 7  | 8½  |
| 6               | 40   | -               | 2  | 3½  | 13               | 0  | 1½  | 13              | -    | -               | 4  | 8½  | 26               | 8  | 4   |
| 6               | 50   | -               | 2  | 4½  | 13               | 4  | 2½  | 14              | -    | -               | 5  | 1   | 28               | 9  | 0   |
| 6               | 60   | -               | 2  | 4½  | 13               | 8  | 2½  | 15              | -    | -               | 5  | 5½  | 30               | 9  | 7½  |
| 6               | 70   | -               | 2  | 5½  | 13               | 12 | 3½  | 16              | -    | -               | 5  | 9½  | 32               | 10 | 8½  |
| 6               | 80   | -               | 2  | 5½  | 13               | 16 | 4½  | 17              | -    | -               | 6  | 2   | 34               | 10 | 11  |
| 6               | 90   | -               | 2  | 6   | 14               | 0  | 5   | 18              | -    | -               | 6  | 6½  | 36               | 11 | 6½  |
| 7               | 0    | -               | 2  | 6½  | 14               | 4  | 6   | 19              | -    | -               | 6  | 10½ | 38               | 12 | 2½  |
| 7               | 10   | -               | 2  | 6½  | 14               | 8  | 6½  | 20              | -    | -               | 7  | 3   | 40               | 12 | 10  |
| 7               | 20   | -               | 2  | 7½  | 14               | 12 | 7½  | 30              | -    | -               | 10 | 10½ | 60               | 19 | 8   |
| 7               | 30   | -               | 2  | 7½  | 14               | 16 | 8½  | 40              | -    | -               | 11 | 6½  | 81               | 5  | 8   |
| 7               | 40   | -               | 2  | 8½  | 15               | 0  | 9   | 50              | -    | -               | 18 | 1½  | 101              | 12 | 1   |
| 7               | 50   | -               | 2  | 8½  | 15               | 4  | 9½  | 60              | -    | -               | 1  | 9½  | 121              | 18 | 6   |
| 7               | 60   | -               | 2  | 9½  | 15               | 8  | 10½ | 70              | -    | -               | 1  | 5   | 142              | 4  | 11  |
| 7               | 70   | -               | 2  | 9½  | 15               | 12 | 11½ | 80              | -    | -               | 1  | 9   | 162              | 11 | 4   |
| 7               | 80   | -               | 2  | 9½  | 15               | 17 | 0½  | 90              | -    | -               | 1  | 12  | 182              | 17 | 9   |
| 7               | 90   | -               | 2  | 10½ | 16               | 1  | 0½  | 100             | -    | -               | 1  | 16  | 203              | 4  | 2   |

TABLE SHOWING EQUIVALENT RATES PER LB. AND CWT.

| Per lb         | Per cwt. | Per lb         | Per cwt | Per lb          | Per cwt. |
|----------------|----------|----------------|---------|-----------------|----------|
| d              | s. d.    | d.             | s. d.   | d.              | s. d.    |
| $\frac{1}{4}$  | 2 4      | $4\frac{1}{4}$ | 39 8    | $8\frac{1}{4}$  | 77 0     |
| $\frac{1}{2}$  | 4 8      | $4\frac{1}{2}$ | 42 0    | $8\frac{1}{2}$  | 79 4     |
| $\frac{3}{4}$  | 7 0      | $4\frac{3}{4}$ | 44 4    | $8\frac{3}{4}$  | 81 8     |
| 1              | 9 4      | 5              | 46 8    | 9               | 84 0     |
| $1\frac{1}{4}$ | 11 8     | $5\frac{1}{4}$ | 49 0    | $9\frac{1}{4}$  | 86 4     |
| $1\frac{1}{2}$ | 14 0     | $5\frac{1}{2}$ | 51 4    | $9\frac{1}{2}$  | 88 8     |
| $1\frac{3}{4}$ | 16 4     | $5\frac{3}{4}$ | 53 8    | $9\frac{3}{4}$  | 91 0     |
| 2              | 18 8     | 6              | 56 0    | 10              | 93 4     |
| $2\frac{1}{4}$ | 21 0     | $6\frac{1}{4}$ | 58 4    | $10\frac{1}{4}$ | 95 8     |
| $2\frac{1}{2}$ | 23 4     | $6\frac{1}{2}$ | 60 8    | $10\frac{1}{2}$ | 98 0     |
| $2\frac{3}{4}$ | 25 8     | $6\frac{3}{4}$ | 63 0    | $10\frac{3}{4}$ | 100 4    |
| 3              | 28 0     | 7              | 65 4    | 11              | 102 8    |
| $3\frac{1}{4}$ | 30 4     | $7\frac{1}{4}$ | 67 8    | $11\frac{1}{4}$ | 105 0    |
| $3\frac{1}{2}$ | 32 8     | $7\frac{1}{2}$ | 70 0    | $11\frac{1}{2}$ | 107 4    |
| $3\frac{3}{4}$ | 35 0     | $7\frac{3}{4}$ | 72 4    | $11\frac{3}{4}$ | 109 8    |
| 4              | 37 4     | 8              | 74 8    | 12              | 112 0    |

## PHARMACY AND POISON LAWS OF GREAT BRITAIN AND IRELAND.

## GREAT BRITAIN.

The Arsenic Act, 1851, recites conditions for the sale of white arsenic.

The Pharmacy Act, 1852, gave the Pharmaceutical Society of Great Britain power to hold examinations and grant title of pharmaceutical chemist

The Pharmacy Act, 1868, comprises regulations for the sale of poisons and registration of retailers and dispensers of same.

The Pharmacy Act, 1869, amends provisions of 1868 Act in the case of medical practitioners and veterinary surgeons.

The Pharmacy Act, 1898, enables chemists and druggists to become members of the Pharmaceutical Society.

SCHEDULE OF POISONS  
PART 1.

*The poisons named in this part may not be sold by retail unless—*

(1) The purchaser be known to the seller, or be introduced by a person known to the seller also.

(2) Each sale be entered in the poison book as follows: (a) date of sale; (b) name and address of purchaser; (c) name and quantity of poison sold;

## IRELAND.

The Arsenic Act, 1851

Sale of Poisons Act (Ireland), 1870, relates to the sale of poisons and adulteration.

Pharmacy Act (Ireland), 1875, creates the Pharmaceutical Society of Ireland, and provides for registration of dispensers and retailers of poisons.

Pharmacy Act (Ireland), 1875, Amendment Act, 1890, creates registered druggists.

Statute-Law Revision (No. 2) Act, 1893, repeals a few minor enactments of the Acts 1870 and 1875.

SCHEDULE OF POISONS.  
PART 1

*Same as in Great Britain.*

## GREAT BRITAIN.

SCHEDULE OF POISONS (*continued*).

(d) purpose for which it is stated to be required; (e) signature of the purchaser, and introducer, if any (Arsenic, *vide* p. 529).

(8) The poison sold must be labelled with (f) the name of the article; (g) the word "Poison"; (h) the name and address of the seller.

Aconite and its preparations.

Arsenic and its preparations.

Atropine and its preparations.

Cantharides.

Corrosive sublimate.

Cyanide of potassium and all metallic cyanides.

Emetic tartar.

Ergot of rye and its preparations.

Prussic acid.

Savin and its oil.

Strychnine.

All poisonous vegetable alkaloids and their salts.

## PART 2.

The poisons named in this part may not be sold by retail unless labelled with (a) the name of the article; (b) the word "poison"; (c) the name and address of the seller.

Ammoniated mercury (commonly known as white precipitate of mercury).

Belladonna and its preparations.

Cantharides, tincture and all vesicating liquid preparations of.

Liquid preparations of carbolic acid and its homologues containing more than 3 per cent. of those substances, except any preparation used as a sheepwash or for any other purpose in connection with agriculture or horticulture.

Chloral hydrate and its preparations.

Chloroform.

Corrosive sublimate, preparations of.

Essential oil of almonds, unless deprived of its prussic acid.

Morphine, preparations of.

Nux vomica and its preparations.

Opium and all preparations of opium or of poppies.

Oxalic acid.

Phenol and its homologues (liquid preparations containing more than 8 per cent.).

Red oxide of mercury (commonly known as red precipitate of mercury).

Vermin-killers, *i.e.*, "every compound containing any poison within the meaning of the Pharmacy Act, 1868, when prepared or sold for the destruction of vermin."

## IRELAND.

Same as in Great Britain.

## PART 2.

Same as in Great Britain.

Same as in Great Britain, with the following additions.

Sulphuric ether.

Phosphorus, and all preparations containing it in a free state.

Preparations of strychnine.

Biniodide of mercury.



## POSTAL REGULATIONS.

## PRINCIPAL POST-OFFICE CHARGES.

## LETTER POST.

|                                             |                          |
|---------------------------------------------|--------------------------|
| <i>Inland</i> .—Not exceeding 4 oz. . . . . | 1 <i>d</i> .             |
| For every additional 2 oz. . . . .          | $\frac{1}{2}$ <i>d</i> . |
| Postcard . . . . .                          | $\frac{1}{2}$ <i>d</i> . |

*Colonial and Foreign*.—To undermentioned British Possessions and Protectorates, viz.: Aden, Ascension, Bahamas, Barbados, Bermudas, British Central Africa, British East Africa, British Guiana, British Honduras, British North Borneo, Canada, Cape Colony, Ceylon, Cyprus, Falkland Islands, Fiji, Gambia, Gibraltar, Gold Coast, Hong Kong, India, Jamaica, Johore, Labuan, Lagos, Leeward Islands (viz., Antigua, St. Kitts, Nevis, Dominica, Montserrat, and the Virgin Islands), Malay States (Protected, viz., Perak, Selangor, Negri-Sembilan, and Pahang), Malta, Mauritius, Natal, Newfoundland, New Zealand, Niger Coast Protectorate, Niger Territory, St. Helena, Sarawak, Seychelles, Sierra Leone, Straits Settlements, Tobago, Trinidad, Turk's Islands, Windward Islands (viz., Grenada St. Lucia, St. Vincent, and the Grenadines), and Zanzibar.

|                                         |                            |
|-----------------------------------------|----------------------------|
| Per $\frac{1}{2}$ oz. . . . .           | 1 <i>d</i> .               |
| Elsewhere per $\frac{1}{2}$ oz. . . . . | 2 $\frac{1}{2}$ <i>d</i> . |
| Postcard . . . . .                      | 1 <i>d</i> .               |

## BOOK POST.

|                                                 |                          |
|-------------------------------------------------|--------------------------|
| <i>Inland</i> .—Not exceeding 2 oz. . . . .     | $\frac{1}{2}$ <i>d</i> . |
| For every additional 2 oz. . . . .              | $\frac{1}{2}$ <i>d</i> . |
| <i>Colonial and Foreign</i> .—Per 2 oz. . . . . | $\frac{1}{2}$ <i>d</i> . |

## PARCEL POST.

|                                                                                   |              |
|-----------------------------------------------------------------------------------|--------------|
| <i>Inland</i> .—Not exceeding 1 lb. . . . .                                       | 3 <i>d</i> . |
| And 1 <i>d</i> . for each additional 1 lb. up to 11 lbs,<br>which is the maximum. |              |

## NEWSPAPER POST.

|                                                     |                          |
|-----------------------------------------------------|--------------------------|
| <i>Inland</i> .—Each registered newspaper . . . . . | $\frac{1}{2}$ <i>d</i> . |
| Colonial and Foreign as book post.                  |                          |

## TELEGRAMS.

|                                                  |                          |
|--------------------------------------------------|--------------------------|
| <i>Inland</i> .—For first twelve words . . . . . | 6 <i>d</i> .             |
| For each additional word . . . . .               | $\frac{1}{2}$ <i>d</i> . |

## POSTAL ORDERS.

The orders are issued for fourteen amounts, upon which poundage is charged as follows:—

| <i>Amount.</i>                                                                             | <i>Poundage.</i> |
|--------------------------------------------------------------------------------------------|------------------|
| 1s. . . . .                                                                                | $\frac{1}{2}d.$  |
| 1s. 6d. . . . .                                                                            | $\frac{1}{2}d.$  |
| 2s., 2s. 6d., 3s., 3s. 6d., 4s., 4s. 6d., 5s., 7s. 6d.,<br>10s., 10s. 6d., . . . . . each, | 1d.              |
| 15s., and 20s., . . . . .                                                                  | $1\frac{1}{2}d.$ |

## INLAND MONEY ORDERS.

|                                     |     |
|-------------------------------------|-----|
| For sums not exceeding £1 . . . . . | 2d. |
| „ exceeding £1 and not exceeding £3 | 8d. |
| „ „ £3 „ „ £10                      | 4d. |

## MONEY ORDERS FOR PLACES ABROAD.

|                                     |         |
|-------------------------------------|---------|
| For sums not exceeding £2 . . . . . | 6d.     |
| „ exceeding £2 and not exceeding £6 | 1s.     |
| „ „ £6 „ „ £10                      | 1s. 6d. |

## REGISTRATION.

Letters, parcels, and postal packets are registered at 2d. to 1s. 2d. each, the compensation ranging from £5 to £120. Coins, watches, or jewellery must be registered. The letters or packets must be marked “Registered,” and handed over the counter at a post office. The special post office envelopes should be used when possible.

## NEWSPAPERS AND BOOKS.

The postal rate on newspapers is  $\frac{1}{2}d.$  each. A packet must not exceed 5 lbs. in weight or 2 feet in length or 1 foot in width or depth. Newspaper wrappers bearing  $\frac{1}{2}d.$  or 1d. stamps are obtainable at 4d. for seven or 8 $\frac{1}{2}d.$  for eight.

Books, if sent by book-post, must be posted either without wrapper, or in an unsealed envelope or cover so as to be easy of inspection. Size of the packet allowed is the same as for newspapers.

Commercial papers such as invoices, orders for goods, advice notes, way-bills, bills of lading, receipts, statements of account, prices current, market reports, etc., are accepted for transmission at the book packet rate, conditionally upon nothing appearing in writing on the documents save dates, the names and addresses of the parties, the particulars and prices of any goods, or the particulars of any sums of money to which the document relates, and the mode of consignment of any such goods or money. Matter in the nature of a letter must be wholly in print, and must relate exclusively to the subject-matter of the document.

Circulars are also received at the book rate.

## PARCELS.

*Limitations.*—The size for an inland parcel is—

Greatest length, 8 $\frac{1}{2}$  feet; greatest length and girth combined, 6 feet.

The maximum weight allowed for an inland parcel is 11 lbs.

Parcels to or from the Channel Islands or the Isle of Man and the

United Kingdom are liable to Customs duty on delivery if they contain anything dutiable.

Compensation up to £2 is allowed for parcels lost or damaged though not registered, under certain conditions, *but not for fragile or perishable articles.*

#### COLONIAL AND FOREIGN SERVICE.

*Book Post.*—The articles permitted to be sent at the book post rate are printed, and commercial papers similar in nature to those already described. The lowest charge for books is  $\frac{1}{2}d.$ , and for commercial papers,  $2\frac{1}{2}d.$ , and up to 10 oz. may be sent for the latter sum. Packets addressed to British Colonies or Possessions and non-Union countries must not exceed 2 feet long and 1 foot wide or deep, and 5 lbs. in weight. To Foreign Countries in the Postal Union the length is limited to 18 inches, and the weight to 4 lbs. A roll may be 30 inches long and 4 inches in diameter. The packets must be open for inspection.

*Patterns and Samples.*—Rate,  $1d.$  the first 4 oz.,  $\frac{1}{2}d.$  for every additional 2 oz. The samples must be *bona fide* trade patterns or samples of merchandise, so packed as to give freedom of inspection. The limit of weight for British Colonies or Possessions or for non-Union countries is 5 lbs., and of dimensions 2 feet by 1 foot by 1 foot.

Parcels conveyed to colonial and foreign parts through the Post Office are subject to the Customs regulations of the country to which they are addressed. Declarations have to be made by the sender *on forms obtainable from the Post Office.* Generally an invoice may be enclosed in the parcel, but not a letter.

#### PROFIT ASSESSMENT.

The following examples show how the questions of profits and percentages upon cost and sales can be calculated. The cost and profit figures may be taken as either pounds, shillings, pence, or farthings.

1. To find the percentage of profit on cost—

Say the cost is 8 and the profit 4.

$$4 \times 100 = 400 \div 8 = 50 \text{ per cent.}$$

2. To find the percentage of profit on sales—

Taking the same figures for cost and profit.

$$4 \times 100 = 400 \div 12 (4 + 8) = 33 \text{ per cent.}$$

3. To find what amount to add to cost to realize a certain rate per cent. upon the cost—

Say the cost is 6 and the rate required 25 per cent.

$$6 \times 25 = 150 \div 100 = 1.5;$$

which may be £1 10s., 1s. 6d., or  $1\frac{1}{2}d.$

4. To find what amount to add to cost to produce a certain rate per cent. upon sales—

Say the cost is 6 and the rate 25.

$$6 \times 25 = 150 \div 75 (100 - 25) = 2.$$

## A HANDY TABLE FOR ASSESSING PROFITS.

By adding to the cost, as follows, the relative percentages of profit are obtained:—

| One half      | 50 per cent. on cost, and | 88 per cent. on sales. |
|---------------|---------------------------|------------------------|
| „ third       | 38·88 „ „                 | 25 „ „                 |
| „ fourth      | 25 „ „                    | 20 „ „                 |
| „ fifth       | 20 „ „                    | 16·6 „ „               |
| „ sixth       | 16·6 „ „                  | 14·28 „ „              |
| „ seventh     | 14·28 „ „                 | 12·5 „ „               |
| „ eighth      | 12·5 „ „                  | 11·11 „ „              |
| „ ninth       | 11·11 „ „                 | 10 „ „                 |
| „ tenth       | 10 „ „                    | 9·09 „ „               |
| „ eleventh    | 9·09 „ „                  | 8·33 „ „               |
| „ twelfth     | 8·33 „ „                  | 7·69 „ „               |
| „ thirteenth  | 7·69 „ „                  | 7·14 „ „               |
| „ fourteenth  | 7·14 „ „                  | 6·66 „ „               |
| „ fifteenth   | 6·66 „ „                  | 6·25 „ „               |
| „ sixteenth   | 6·25 „ „                  | 5·88 „ „               |
| „ seventeenth | 5·88 „ „                  | 5·55 „ „               |
| „ eighteenth  | 5·55 „ „                  | 5·26 „ „               |
| „ nineteenth  | 5·26 „ „                  | 5 „ „                  |
| „ twentieth   | 5 „ „                     | 4·76 „ „               |

## RELATION OF THE IMPERIAL TO THE METRIC STANDARDS.

## STANDARDS OF MASS.

1 Pound=453·59248 grammes.

1 Ounce=28·34953 grammes. or 28·35 grm. nearly.

1 Grain=0·064798918 gramme, or 0·0648 grm. „

## STANDARDS OF CAPACITY.

1 Gallon=4·5459631 litres

1 Pint=0·5682454 litre, or 568·336 cubic centimetres nearly.

1 Fluid Ounce=0·0284123 litre, or 28·417 cubic centimetres nearly.

1 Fluid Drachm=0·003552 litre, or 3·552 cubic centimetres „

1 Minim=0·000059 litre, or 0·059 cubic centimetre nearly.

## STANDARDS OF LENGTH.

1 Yard=0·914399 metre.

1 Foot=0·30480 metre=30·48 centimetres.

1 Inch=0·02540 metre=25·40 millimetres.

## SOLUBILITIES OF CHEMICALS, ETC., B.P., 1898.

|                                 | Cold Water.      | Boiling Water  | Alcohol, 90%.    | Ether.            | Chloroform.     | Glycerine.     |
|---------------------------------|------------------|----------------|------------------|-------------------|-----------------|----------------|
| Acetanilid . . . . .            | 1 in 200         | 1 in 18        | 1 in 4           | freely soluble    | freely soluble  | 1 in 5         |
| Acid Arsenios . . . . .         | 1 in 100         | 1 in 10        | 1 in 3           | 1 in 2½           | 1 in 7          | 1 in 4         |
| " Benzoic . . . . .             | 1 in 400         | 1 in 17        | 1 in 80          | freely soluble    | freely soluble  | freely soluble |
| " Boric . . . . .               | 1 in 30 (?)      | 1 in 3         | slightly less    | slightly soluble  |                 |                |
| " Carbolic . . . . .            | 1 in 12          | 1 in 4         | soluble          | 1 in 40           |                 | 1 in 12 (?)    |
| " Citric . . . . .              | 1 in 4           | 1 in 4         | 1 in 5           | 1 in 2            |                 | 1 in 200       |
| " Gallic . . . . .              | 1 in 100         | 1 in 3         | 1 in 3           |                   |                 | 1 in 1         |
| " Salicylic . . . . .           | 1 in 500         | 1 in 15        | 1 in 1           |                   |                 | freely soluble |
| " Tannic . . . . .              | 1 in 1           |                | less than 1 in 3 |                   |                 |                |
| " Tartaric . . . . .            | less than 1 in 1 | 1 in 4         | insoluble        |                   |                 | freely soluble |
| Alum. . . . .                   | 1 in 10          |                | 1 in 80          |                   |                 | 1 in 8         |
| Ammon. Benz. . . . .            | 1 in 6           |                |                  |                   |                 |                |
| " Carb. . . . .                 | 1 in 4           |                | 1 in 60          |                   |                 |                |
| " Chloride . . . . .            | 1 in 3           |                | insoluble        |                   |                 |                |
| " Phosph. . . . .               | 1 in 4           |                | almost insoluble |                   |                 |                |
| Antimonium Tartaratum . . . . . | 1 in 17          | 1 in 3         | more soluble     |                   |                 |                |
| Apomorph. Hydrochlor. . . . .   | 1 in 50          |                | slightly soluble | soluble           |                 |                |
| Argent Nitras . . . . .         | less than 1 in 1 |                | readily soluble  | readily soluble   | readily soluble | soluble        |
| Atropine . . . . .              | 1 in 300         |                | 1 in 10          | insoluble         | insoluble       |                |
| " Sulph. . . . .                | 1 in 1           | 1 in 4         | insoluble        |                   |                 | 1 in 1         |
| Borax . . . . .                 | 1 in 25          |                | 1 in 1           |                   |                 | 1 in 1         |
| Butyl Chloral Hydrate . . . . . | 1 in 50          | easily soluble | easily soluble   | sparingly soluble | 1 in 20         |                |
| Caffeina . . . . .              | 1 in 80          |                |                  |                   | easily soluble  |                |
| " Citras . . . . .              | 1 in 32          |                |                  |                   |                 |                |
| " Calcii Chlorid. . . . .       | 1 in 1           |                | 1 in 3           |                   |                 |                |
| " Hypophos. . . . .             | 1 in 8           |                | insoluble        |                   |                 |                |
| Camphor . . . . .               | 1 in 700         |                | about 1 in 1     | very soluble      | 1 in 4          |                |
| Chloral Hydrate . . . . .       | less than 1 in 1 |                | less than 1 in 1 | less than 1 in 1  | 1 in 4          |                |
| Cocaina . . . . .               | almost insoluble |                | 1 in 10          | 1 in 4            | 1 in 4          | insoluble      |

SOLUBILITY OF CHEMICALS, ETC. (*continued*).

|                          | Cold Water.            | Boiling Water | Alcohol, 80 %       | Ether.                | Chloroform.           | Glycerine.   |
|--------------------------|------------------------|---------------|---------------------|-----------------------|-----------------------|--------------|
| Cocainæ Hydrochlor. . .  | 1 in 4                 |               | 1 in 4              | almost insoluble      |                       | 1 in 4       |
| Codeina . . . . .        | 1 in 80                |               | readily soluble     | 1 in 80               | readily soluble       |              |
| " Phosphate . . . .      | 1 in 4                 |               | much less soluble   |                       |                       |              |
| Cresote . . . . .        | 1 in 400               |               | freely soluble      | freely soluble        |                       | very soluble |
| Cupri Sulph. . . . .     | 1 in 3½                |               | almost insoluble    |                       |                       |              |
| Ferri et Ammon. Cit. .   | 1 in 4                 |               | almost insoluble    |                       |                       |              |
| Ferri et Quin. Citras. . | 1 in 4                 |               |                     |                       |                       |              |
| Ferri Sulphas . . . .    | less than 1 in 2       | 1 in 24       | insoluble           | slightly soluble      | slightly soluble      |              |
| Glusidum . . . . .       | 1 in 400               |               | 1 in 25             |                       |                       |              |
| Homatropinæ Hydrobrom.   | 1 in 6                 | 1 in 2        | 1 in 133 (absolute) | 1 in 4                | 1 in 2                |              |
| Hyd. Perchlor. . . . .   | 1 in 16                |               | 1 in 8              | very slightly soluble | very slightly soluble |              |
| Hyoscine Hydrobrom. .    | 1 in 1                 |               | 1 in 13             | very slightly soluble | very slightly soluble |              |
| Hyoscyaminæ Sulph. . .   | 1 in ½                 |               | 1 in 2½             | freely soluble        | freely soluble        |              |
| Iodoform . . . . .       | very slightly soluble  |               | 1 in 80 cold        |                       |                       |              |
| Iodine . . . . .         | 1 in 5000              |               | 1 in 10 boiling     |                       |                       |              |
| Lithii Carb. . . . .     | 1 in 70                |               | freely soluble      |                       |                       |              |
| " Cit. . . . .           | 1 in 2                 |               | insoluble           |                       |                       |              |
| Mag. Sulph. . . . .      | 1 in 1                 |               |                     |                       |                       |              |
| Morphinæ Acet. . . . .   | 1 in 2½                | 1 in 1        | 1 in about 100      |                       |                       |              |
| " Hydrochlor. . . .      | 1 in 24                |               | 1 in 50             |                       |                       |              |
| " Tartras . . . . .      | 1 in 11                |               | almost insoluble    |                       |                       |              |
| Naphthol . . . . .       | 1 in 1000              | 1 in 75       | less than 1 in 2    | very soluble          | very soluble          |              |
| Paraldehyd. . . . .      | 1 in 10                | less soluble  | all proportions     | all proportions       |                       |              |
| Pepsin . . . . .         | moderately soluble     |               | 1 in 100            |                       |                       |              |
| Phenacetin . . . . .     | very sparingly soluble | more freely   | 1 in 20             |                       |                       |              |
| Phenazone . . . . .      | 1 in 1                 |               | 1 in 1½             | 1 in 40               | 1 in 1½               |              |
| Phosphorus . . . . .     | insoluble              |               | 1 in 350 (absolute) | 1 in 80               | 1 in 25               |              |



SOLUBILITY OF CHEMICALS, ETC (*continued*).

|               | Cold Water             | Boiling Water     | Alcohol, 90                   | Ether            | Chloroform | Glycerine |
|---------------|------------------------|-------------------|-------------------------------|------------------|------------|-----------|
| Salol         | almost insoluble       |                   |                               |                  |            |           |
| Santonin      | scarcely soluble       | sparingly soluble | 1 in 10 very soluble, boiling | 1 in 4           | 1 in 4     |           |
| Sapo Durus    |                        | 1 in 1½           | 1 in 40, cold                 |                  |            |           |
| Sodn Arsen    | 1 in 20                |                   | 1 in 3, boiling               |                  |            |           |
| " Benz        | 1 in 6                 |                   | soluble                       |                  |            |           |
|               | 1 in 2                 |                   | slightly soluble              |                  |            |           |
| " Bicarb      | 1 in 11                |                   | 1 in 24, cold                 |                  |            |           |
| " Bromid      | less than 1 in 2       |                   | 1 in 12 boiling               |                  |            |           |
| " Carb        | 1 in 2                 |                   | 1 in 16                       |                  |            |           |
| " Chlorid     | less than 1 in 3       |                   |                               |                  |            |           |
| " Hypophos    | 1 in 1                 |                   | 1 in 30                       | insoluble        |            |           |
| " Iodid       | less than 1 in 1       |                   | 1 in 3                        |                  |            |           |
| " Phosphas    | 1 in 6                 |                   | 1 in 6                        |                  |            |           |
| " Salicylas   | less than 1 in 1       |                   | insoluble                     |                  |            |           |
| " Sulphas     | 1 in less than 4       |                   |                               |                  |            |           |
|               | (77° to 86 F)          |                   |                               |                  |            |           |
| " Sulphocarb  | 1 in 6                 |                   | 1 in 150                      | nearly insoluble | 1 in 6     |           |
| Strychnine    | very sparingly soluble |                   | 1 in 150, cold                |                  |            |           |
| " Hydrochlor  | 1 in 35                |                   |                               |                  |            |           |
| Sulphonal     | 1 in 450               | 1 in 15           | 1 in 60                       | soluble          |            |           |
|               |                        |                   | 1 in 50 cold                  |                  |            |           |
|               |                        |                   | very soluble, boiling         |                  |            |           |
| Sulphur Iodid | insoluble              |                   |                               |                  |            | 1 in 60   |
| Veratrine     | insoluble              |                   |                               |                  |            |           |
| Zinci Acet    | 1 in 24                |                   | 1 in 3                        | 1 in 6           | 1 in 3     |           |
| " Sulphas     | less than 1 in 1       |                   |                               |                  |            |           |
| " Sulphocarb  | 1 in 2                 |                   | 1 in 2½                       |                  |            |           |



## TRANSFORMATION OF COLUMNS OF WATER INTO COLUMNS OF MERCURY.

| Millim. of Water. | Millim. of Mercury. | Millim. of Water. | Millim. of Mercury. |
|-------------------|---------------------|-------------------|---------------------|
| 1                 | ·074                | 85                | 2·58                |
| 2                 | ·15                 | 40                | 2·95                |
| 3                 | ·22                 | 45                | 3·32                |
| 4                 | ·30                 | 50                | 3·69                |
| 5                 | ·37                 | 55                | 4·06                |
| 6                 | ·44                 | 60                | 4·43                |
| 7                 | ·52                 | 65                | 4·80                |
| 8                 | ·59                 | 70                | 5·17                |
| 9                 | ·66                 | 75                | 5·54                |
| 10                | ·74                 | 80                | 5·90                |
| 15                | 1·12                | 85                | 6·27                |
| 20                | 1·48                | 90                | 6·64                |
| 25                | 1·84                |                   |                     |
| 30                | 2·21                |                   |                     |

## VARIOUS USEFUL DATA.

To reduce specific gravity with regard to air, to specific gravity with regard to hydrogen, multiply by 14·438.

To reduce specific gravity with regard to hydrogen, to specific gravity compared to air, multiply by ·06926.

To reduce weight in air to weight in vacuo :

P=weight required in vacuo.

q=weight in air.

V=volume of body weighed.

v=volume of the weights.

s=specific gravity of air (weight of one cubic unit).

$$P=q \times s (V-v).$$

To find the circumference of a circle :

a=circumference. r=diameter.

n=3·1415926. a=n r.

To find contents of a sphere=c :

c=d<sup>3</sup> × ·5236. d=diameter.

To find contents of a cylinder=c :

c=area of base, × height.

To find the contents of a rectangular vessel=c :

a=length. h=height.

b=breadth. c=a × b × h.

To convert the degrees of Twaddle's hydrometer into specific gravity, multiply by 5, and add 1000; this gives the specific gravity with reference to water as 1000.

To convert lbs. per square inch into kilograms per square centimetre, multiply by ·0708.

To convert kilograms per square centimetre into lbs. per square inch, multiply by 14·2247.

To reduce inches to metres, multiply by ·02540.

To reduce inches to centimetres, multiply by 2·540.

To reduce centimetres to inches, multiply by  $\cdot 3937$ .

To reduce kilograms to pounds, multiply by  $2\cdot 2046$ .

To reduce litres to gallons, multiply by  $\cdot 22$ .

To reduce gallons to litres, multiply by  $4\cdot 548$ .

To reduce pints to cubic centimetres, multiply by  $567\cdot 986$ .

To reduce grams to grains, multiply by  $15\cdot 482$ .

To reduce grains to grams, multiply by  $\cdot 0648$ .

To reduce ounces to grams, multiply by  $28\cdot 349$ .

The following data are useful in calculations relating to air :

To find the quantity of nitrogen by volume corresponding to 1 volume of oxygen, multiply by  $3\cdot 770992$ .

To find the quantity of oxygen by volume corresponding to 1 volume of nitrogen, multiply by  $\cdot 265182$ .

To find the quantity of nitrogen by weight corresponding to 1 part by weight of oxygen, multiply by  $3\ 313022$ .

To find the quantity of oxygen by weight corresponding to 1 part by weight of nitrogen, multiply by  $\cdot 301839$ .

To find the quantity of nitrogen by volume corresponding to 1 part by weight of oxygen, multiply by  $2\cdot 6365411$ .

To find the quantity of oxygen by volume corresponding to 1 part by weight of nitrogen, multiply by  $\cdot 2730071$ .

To find the quantity of nitrogen by weight corresponding to 1 part by volume of oxygen, multiply by  $3\cdot 6629154$ .

To find the quantity of oxygen by weight corresponding to 1 part by volume of nitrogen, multiply by  $\cdot 3792848$ .

## WEIGHTS AND MEASURES OF IMPERIAL SYSTEM.

### MEASURES OF MASS.

|                  |     |                   |
|------------------|-----|-------------------|
| 1 grain          | gr. |                   |
| 1 ounce (avoir.) | oz. | =437·5 grains.    |
| 1 pound          | lb. | =16 ounces=7000 „ |

### MEASURES OF CAPACITY.

|                |         |                   |
|----------------|---------|-------------------|
| 1 minim        | min.    |                   |
| 1 fluid drachm | fl. dr. | =60 minims.       |
| 1 fluid ounce  | fl. oz. | =8 fluid drachms. |
| 1 pint         | O       | =20 fluid ounces. |
| 1 gallon       | C       | =8 pints.         |

### MEASURES OF LENGTH.

|        |     |             |
|--------|-----|-------------|
| 1 inch | in. |             |
| 1 foot | ft. | =12 inches. |
| 1 yard | yd. | =36 „       |

### RELATION OF VOLUME TO MASS.

|                 |                                      |                           |
|-----------------|--------------------------------------|---------------------------|
| 1 minim         | is the volume at 62°F. of            | 0·9114583 grain of water. |
| 1 fluid drachm  | „ „                                  | 54·6875 grains „          |
| 1 fluid ounce   | „ 1 ounce or                         | 437·5 „ „                 |
| 1 pint          | „ 1·25 pounds or                     | 8750·0 „ „                |
| 1 gallon        | „ 10 pounds or                       | 70000·0 „ „               |
| 109·7148 minims | <sup>1</sup> =the volume at 62°F. of | 100 „ „                   |

<sup>1</sup> Taken as 110 minims throughout the Pharmacopœia.

## WEIGHTS AND MEASURES OF METRIC SYSTEM

## MEASURES OF MASS

- 1 milligramme=the thousandth part of one gram or 0.001 gram  
 1 centigramme=the hundredth part of one gram or 0.01 gram  
 1 decigramme =the tenth part of one gram or 0.1 gram  
 1 gramme =weight of one millilitre of distilled water at 4°C (39.2°F.  
 or 10 gms  
 1 dekagramme=ten grammes or 10.0 gms  
 1 hectogramme=one hundred grammes or 100.0 gram  
 1 kilogramme =one thousand grammes or 1000.0 gms

## MEASURES OF CALACITY

- 1 millilitre = the volume at 4°C of 1 gram of water  
 1 centilitre = " " of 10 " "  
 1 decilitre = " " of 100 " "  
 1 litre = " " of 1000 gram (1 kilogram)

## MEASURES OF LENGTH

- |              |                                    |                |
|--------------|------------------------------------|----------------|
| 1 millimetre | = one thousandth part of one metre | or 0.001 metre |
| 1 centimetre | = one hundredth                    | , , or 0.01 "  |
| 1 decimetre  | = one tenth                        | , " or 0.1 "   |
| 1 metre      |                                    | 10 ,           |

## RELATION OF CUBIC MEASURES TO MEASURES OF CAPACITY

- 1 cubic centimetre = 0.001 millilitre  
1 cubic decimetre = 0.001 litre, or 1000 cubic centimetres

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- 1 000 000 cubic centimetres = 1 millilitre  
1 000 000 cubic decimetres = 1 litre, or 1000 millilitres.



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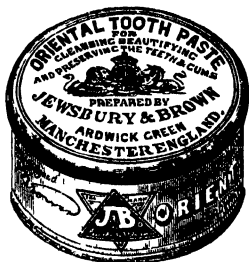
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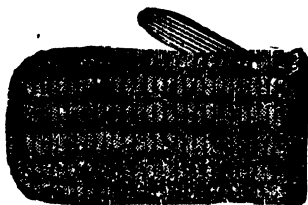
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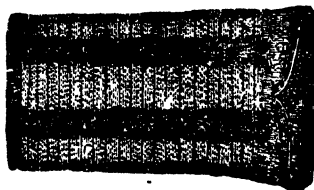
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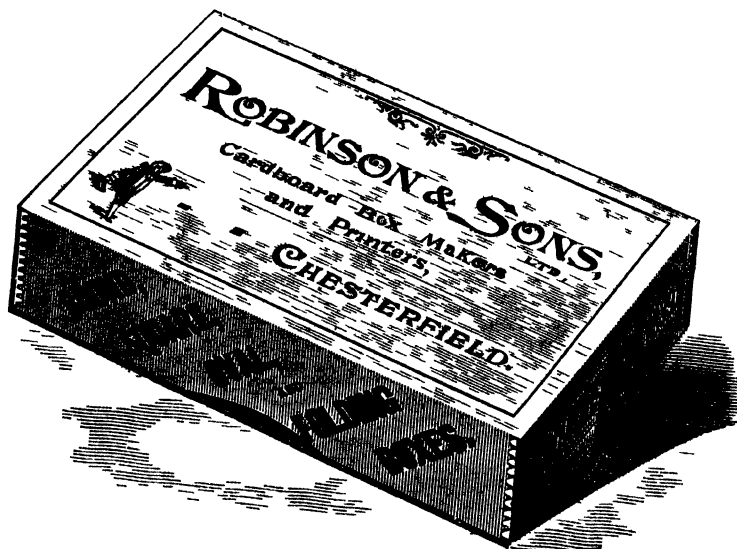
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| Whiffen's (T) Quinine and other Preparations              | 575                       |
| White (Alfred) & Sons' Aethers, Bismuth, etc              | 588                       |
| Woolley (J), Sons & Co, Drug Millers, Wholesale Druggists | 590                       |
| Wright, Layman & Umney, Wholesale Druggists               | 577                       |
| Yanatas for Sea Sickness                                  | 582                       |

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